SIXTH FIVE-YEAR REVIEW REPORT FOR
SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
HILLSBOROUGH COUNTY, NEW HAMPSHIRE

Prepared by

U.S. Environmental Protection Agency
Region 1
Boston, Massachusetts

BRYAN OLSON

Digitally signed by BRYAN OLSON
Date: 2023.09.13 13:34:18 -04'00'

Bryan Olson, Director
Superfund and Emergency Management Division

Date

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LIST OF ABBREVIATIONS & ACRONYMS

AGQS	Ambient Groundwater Quality Standard
ALM	Adult Lead Methodology
ARAR	Applicable or Relevant and Appropriate Requirement
AROD	Record of Decision Amendment
ATSDR	Agency for Toxic Substances and Disease Registry
BLL	Blood Lead Level
CASRN	Chemical Abstracts Service Registry Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethylene
Cis-1,2-DCE	cis-1,2-Dichloroethylene
Trans-1,2-DCE	trans-1,2-Dichloroethylene
DNAPL	Dense Nonaqueous Phase Liquid
EPA	United States Environmental Protection Agency
ERH	Electrical Resistance Heating
ESD	Explanation of Significant Differences
ETBE	Ethyl Tertiary Butyl Ether
FFS	Focused Feasibility Study
FYR	Five-Year Review
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (Gen-X)
HQ	Hazard Quotient
IC	Institutional Control
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk
LTMP	Long Term Monitoring Program
MCL	Maximum Contaminant Level
MIHpt	Membrane Interface Probe and Hydraulic Profiling Tool
MRL	Minimal Risk Level
µg/dL	Micrograms per Deciliter
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
mg/kg-day	Milligrams per Kilogram per Day
mg/L	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NHBB	New Hampshire Ball Bearings, Inc.
NHDES	New Hampshire Department of Environmental Services
NPL	National Priorities List
ng/L	Nanograms per Liter
O&M	Operations and Maintenance
OHHRRAF	OLEM's Human Health Regional Risk Assessment Forum
OLEM	Office of Land and Emergency Management
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl Compound
PCE	Tetrachloroethylene
PDI	Pre-Design Investigation
PFAS	Per- and Polyfluoroalkyl Substances
PFBA	Perfluorobutanoic Acid

PFBS	Perfluorobutane Sulfonic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
ppb	Parts per Billion
ppm	Parts per Million
ppt	Parts per Trillion
PPRTV	Provisional Peer Reviewed Toxicity Value
PRB	Permeable Reactive Barrier
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SDE	Staff Development for Educators
SVE	Soil Vapor Extraction
tBA	Tert-Butyl Alcohol
TBC	To Be Considered
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TI	Technical Impracticability
UU/UE	Unlimited Use and Unrestricted Exposure
VES	Vacuum Extraction System
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the sixth FYR for the South Municipal Water Supply Well Superfund Site. The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU). This FYR Report addresses the Site.

EPA Remedial Project Manager (RPM) Valerie Jurgens led the FYR. Participants from EPA included New Hampshire Superfund Section Chief Melissa Taylor, human health risk assessor Courtney Carroll, ecological risk assessors Valeria Paz and Bart Hoskins, community involvement coordinator (CIC) Ashlin Brooks, and site attorney Ruthann Sherman. Other participants included Stephanie Monette from the New Hampshire Department of Environmental Services (NHDES), and Kirby Webster and Kim Johnson Chase from EPA support contractor Skeo. The potentially responsible party (PRP), New Hampshire Ball Bearings, Inc. (NHBB), was notified of the initiation of the FYR. The review began on 1/30/2023.

Appendix A includes a list of documents reviewed for this FYR. Appendix B provides a chronology of Site events.

Site Background

The Site is in the town of Peterborough in Hillsborough County, New Hampshire (Figure 1). In 1982, the New Hampshire Water Supply and Pollution Control Commission found high concentrations of volatile organics in a sample of water from the South Municipal Water Supply Well (South Well), which is approximately 70.5 feet deep. Subsequent investigations determined that solvent use and disposal at the NHBB facility had resulted in a plume of contaminated groundwater extending from under the NHBB property to the vicinity of the South Well, which is about a quarter mile to the east. The Site includes the NHBB property, adjacent wetlands and contaminated groundwater under nearby commercial, school and residential properties along Sharon Road (Figure 1). The NHBB facility remains active.

Land use in the vicinity of the Site, particularly east of the Contoocook River, is rural and undeveloped. Lionheart Classical Academy (previously referred to as the former Staff Development for Educators [SDE] building), a charter school, is about 1,000 feet north of the South Well. Residences are west of the NHBB property, along Old Jaffrey Road (Figure 1). A municipal water system that receives water from three wells north of the town center services the Site and adjacent areas. The closest residential wells are about a half mile north of the Site (upgradient).

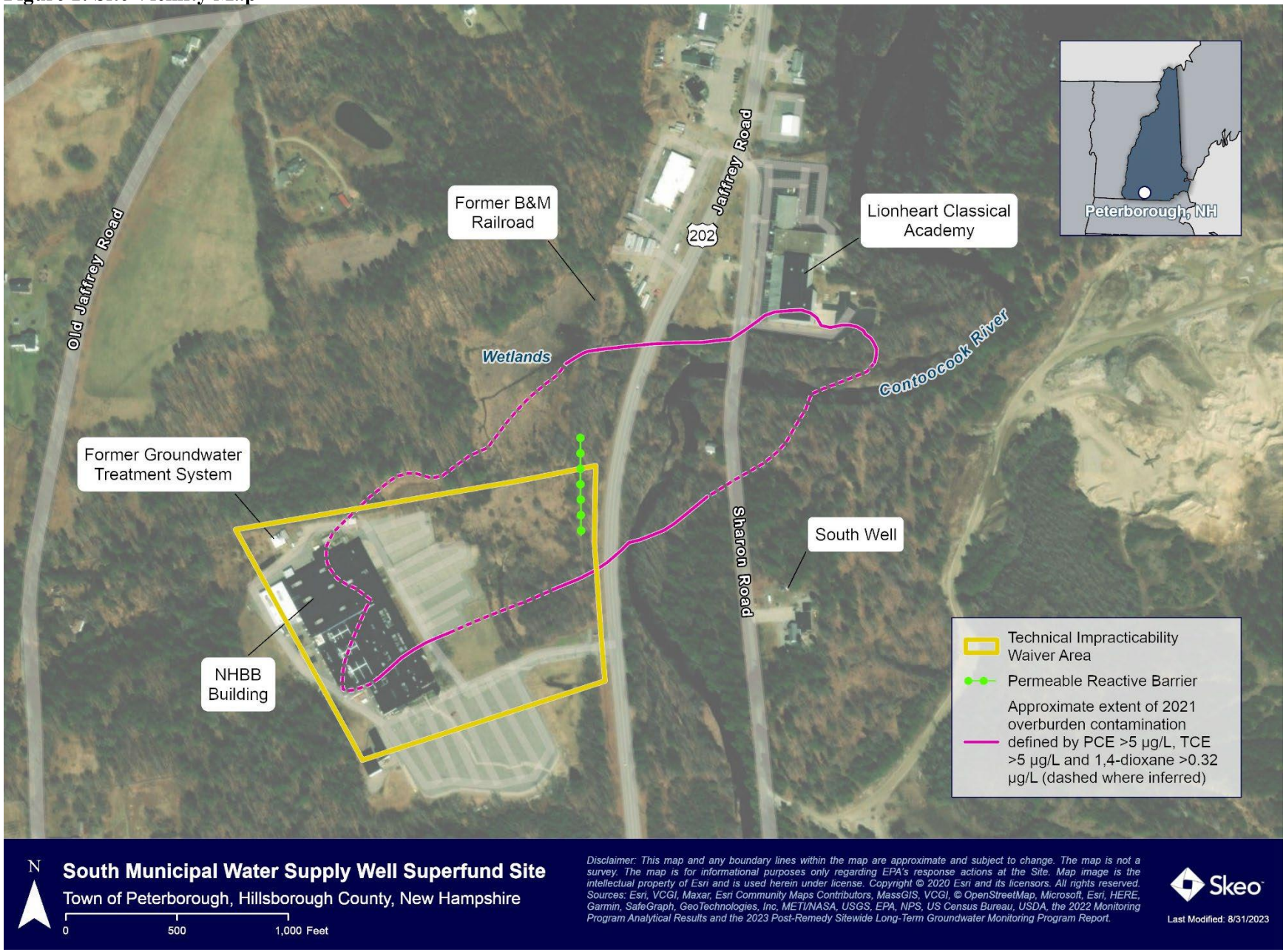
The Site is in the Contoocook River drainage basin. A small unnamed brook transects the NHBB property at its north end, where it empties into the wetlands area of the NHBB property. Two aquifers underly the Site: a semi-confined-to-unconfined overburden aquifer and a bedrock aquifer. The overburden aquifer is distinct from the bedrock aquifer, but the two aquifers are hydraulically connected. The highest concentrations of contaminants and largest plume extents are present in the upper and middle portions of the overburden aquifer. The average flow direction in the overburden aquifer is east-northeast in the vicinity of the NHBB plant and changes to a northerly direction at the Contoocook River, paralleling the river. The groundwater velocities are unusually high, as the

media is coarse and the gradients are large. Contamination extent and flow is not well understood in the bedrock aquifer. However, nearby potable wells within a 1-mile radius of the Site have been sampled and did not exceed federal maximum contaminant levels (MCLs). The Data Review section of this FYR Report discusses potable well sampling results further.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: South Municipal Water Supply Well		
EPA ID: NHD980671069		
Region: 1	**State:** NH	**City/County:** Peterborough/Hillsborough
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA ***[If "Other federal agency", enter agency name]*:**		
Author name: Valerie Jurgens		
Author affiliation: EPA		
Review period: 1/30/2023 – 9/1/2023		
Date of site inspection: 4/17/2023		
Type of review: Statutory		
Review number: 6		
Triggering action date: 9/20/2018		
Due date *(five years after triggering action date)*: 9/20/2023		

Figure 1: Site Vicinity Map



II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The South Well was installed in 1952 and provided water to Peterborough for 30 years. In October 1982, the New Hampshire Water Supply and Pollution Control Commission (now NHDES) found over 100 parts per billion (ppb) of total volatile organic compounds (VOCs) in a sample of water from the South Well. At the recommendation of EPA and the State, the Town discontinued the use of the South Well. Subsequent investigations determined that solvent use and disposal at the nearby NHBB had resulted in a plume of contaminated groundwater extending from under the NHBB property to the vicinity of the South Well. The principal solvents that NHBB had used and were detected in the groundwater were tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA). Site investigations identified groundwater contamination in the form of dense nonaqueous phase liquids (DNAPL), as well as in dissolved form. EPA added the Site to the Superfund program's National Priorities List (NPL) in September 1984.

The Site's 1989 Remedial Investigation (RI) Report found increased cancer risk and significant potential adverse noncancer health effects associated with ingestion of contaminated groundwater and potential cancer risk due to sediment contamination in wetlands east of the NHBB building through dermal absorption and incidental ingestion. The RI also found adverse environmental impacts due to the contaminated wetland sediments. It also found that soil contamination exceeded cancer risk ranges for direct contact and contributed to groundwater contamination. EPA selected a remedy for the Site in 1989 based on groundwater containing volatile organic solvents (PCE, TCE, 1,1,1-TCA) and wetland sediments located on the NHBB property containing polychlorinated biphenyl compounds (PCBs) and polycyclic aromatic hydrocarbons (PAHs).

The primary site contaminant risks were from ingestion of contaminated groundwater by residents and incidental ingestion of contaminated sediments. The Site's 2010 Record of Decision Amendment (AROD) also acknowledged potential human health risks due to vapor intrusion.

Response Actions

EPA signed the Site's Record of Decision (ROD) in September 1989. The ROD included the following remedial action objectives (RAOs):

- Eliminate or minimize, to the maximum extent practicable, the threat posed to the public health, welfare and environment by the current extent of contamination for groundwater, soils and sediments.
- Eliminate or minimize the migration of contaminants from the soils into the groundwater.
- Meet federal and state applicable or relevant and appropriate requirements (ARARs).

To meet the RAOs, the 1989 ROD included the following remedy components:

- Overburden groundwater extraction and treatment, with air stripping and carbon columns for air emission control.
- In-situ vacuum extraction of contaminated soils.
- Excavation and/or dredging of sediments, followed by dewatering and off-site disposal of the material.
- Wetlands restoration.
- Long-term environmental monitoring.
- Institutional controls, including restrictions on the use of the South Municipal water supply well and preventing installation of private wells that could draw in contaminated groundwater.
- Five-year reviews of the Site's remedy.

Between July 1990 and January 1993, extensive pre-design investigations were undertaken, and the design of the remedy was finalized. As a result of the more detailed technical information during these pre-design investigations, EPA issued an ESD in May 1993. It documented the following modifications to the remedy:

- Remove the requirement for air emission controls.
- Modify the sediment removal remedy to reduce the amount of wastewater generated and leave in place a small area of sediments with contamination slightly above the cleanup level that was infeasible to remove.

- Use air sparging to enhance DNAPL removal.
- Allow for natural attenuation of a small portion of the leading edge of the contaminant plume.

EPA issued the Site's second ESD in February 1997. It:

- Waived federal MCLs for select groundwater contaminants of concern (COCs) at a portion of the Site due to a technical impracticability (TI), from an engineering perspective, to restore portions of the contaminated groundwater beneath the NHBB property in a reasonable timeframe. This area is known as the TI Waiver Area.
- Discontinued operation of the vacuum extraction system (VES).
- Removed air sparging as a remedy component, which was selected in the 1993 ESD but was never implemented due to technical issues, and modified the groundwater extraction and treatment remedy to create a hydraulic barrier between the NHBB plume and the rest of the aquifer.
- Required long-term groundwater monitoring to ensure that groundwater within the TI Waiver Area is hydraulically contained.
- Required a deed restriction on the NHBB property prohibiting extraction of groundwater for purposes other than remedial action unless it is treated to appropriate use standards and does not adversely affect the remedial action.

The desired outcome of the 1997 TI Waiver Area remedy change was to effectively capture and contain the contaminant plume within the TI Waiver Area while allowing the use of the South Well as a drinking water source.

The Site's 2008 FYR determined that the hydraulic containment remedy was not functioning as effectively as intended by the 1989 ROD, as modified by subsequent ESDs. EPA determined the remedy was not protective of human health or the environment, in part, because it could not capture all portions of the contaminated groundwater while the South Well was operating and because groundwater contaminant levels in areas outside of the TI Waiver Area were still above drinking water standards. The results of a long-term pumping test demonstrated the hydraulic extraction and containment system at the TI Waiver Area boundary was not capable of containing the plume of contaminated groundwater to areas within the TI Waiver Area when the South Well operates for extended periods.

Following a focused feasibility study (FFS) completed in 2009, EPA issued the Site's AROD in September 2010. The RAOs presented in the AROD, which replaced the previous RAOs, are:

- Restore the entire aquifer outside of the TI Waiver Area to drinking water quality (i.e., MCLs) in as short a time as practicable to return the South Municipal Water Supply Well to the town of Peterborough as a drinking water source without implementation of wellhead treatment.
- Prevent the migration of contamination from within the TI Waiver Area into other portions of the aquifer, the dilute plume area, and overlying structures to the extent practicable.
- Reduce contaminant concentrations within the TI Waiver Area.
- Reduce soil contaminant concentrations outside the TI Waiver Area to NHDES Method 1 Category S-1 soil standards.
- Prevent exposure to the contaminated soil and groundwater both within the TI Waiver Area and outside the TI Waiver Area.

The 2010 AROD, which eliminated the original groundwater extraction and treatment remedy, included the following remedy components:

- In-situ thermal treatment of contaminated soil and groundwater in identified source areas.
- In-situ bioremediation of contaminated soil and groundwater after the in-situ thermal treatment program.
- In-situ treatment of contaminated groundwater via a permeable reactive barrier (PRB) wall.
- Monitoring and maintenance of existing institutional controls that prohibit the use of groundwater.
- Long-term monitoring of site groundwater.
- Five-year reviews of the Site's remedy.

Table 1 lists the soil and groundwater cleanup levels selected in the 2010 AROD.

Table 1: Soil and Groundwater Cleanup Levels (outside TI Waiver Area)

COC	Soil Cleanup Level (mg/kg)[a]	Groundwater Cleanup Level (µg/L)[b]
PCE	2	5
TCE	0.8	5
1,1,1-TCA	78	200
Cis-1,2- dichloroethylene (cis-1,2-DCE)	2	70
Trans-1,2-DCE	9	100
1,1-DCE	2	7
1,1-Dichloroethane (DCA)	3	81[c]
Vinyl Chloride	1	2
1,4-Dioxane	5	3[c]

Notes:

a. Based on New Hampshire Method 1 Category S-1 soil standard (available at https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/rcmp-appendix-a-e.pdf), which is based on a residential exposure scenario.
b. Based on federal MCLs unless otherwise noted.
c. Based on the then current New Hampshire Method 1 GW-1 ambient groundwater quality standard.

mg/kg = milligrams per kilogram
µg/L = micrograms per liter
Source: Table 3 of Site's 2010 AROD.

Status of Implementation

Sediment

The 1993 ESD determined that excavation of sediments was appropriate, and that a small area of sediments with low levels of contamination that was infeasible to remove would be left in place. In 1994, PRP contractors removed 1,996 tons of contaminated sediment from wetlands east of the NHBB building and disposed of them at the Turnkey Landfill in Rochester, New Hampshire, a Resource Conservation and Recovery Act (RCRA)-compliant landfill. EPA performed a pre-final inspection and a follow-up inspection with confirmation sampling to ensure completion of the sediment removal and backfilling. Backfilling with enriched, hydric soils to original grade and replanting finished in November 1994.

Soil and Groundwater

The overburden groundwater extraction and treatment system and the in-situ VES began operating in 1994. The VES continued operating until 1997, when EPA issued the Site's second ESD. After reviewing results of groundwater monitoring, EPA re-evaluated whether it was possible to restore a portion of the contaminated groundwater in a reasonable timeframe and issued the second ESD in February 1997. The 1997 ESD created the TI Waiver Area. Subsequently, the groundwater extraction system was modified to maintain a hydraulic barrier between the NHBB plume and the rest of the aquifer, and the VES ceased operation.

The September 2010 AROD modified the Site remedy to include components that focus on source area reduction as well as dissolved plume treatment and management. An extensive pre-design investigation (PDI) from July 2010 through December 2013 provided the basis for the PRB wall and in-situ thermal treatment designs.

EPA approved the PRB wall design in December 2013. Construction of the PRB wall took place from April 2014 through July 2014, with the installation and development of the associated groundwater monitoring well array completed from September 2014 through October 2014. The approximately 350-foot-long PRB was placed along the bed of the former Boston and Maine Railroad Line, roughly parallel with Route 202, in the center of the groundwater plume, to intercept and treat groundwater leaving the TI Waiver Area of the Site (Figure 1).

Following the installation of the PRB, pumping for the groundwater extraction system was discontinued after approximately 20 years of operation, as specified in the 2010 AROD.

EPA approved the in-situ thermal treatment design in December 2015; it specified electrical resistance heating (ERH) as the thermal technology to be used. The implementation of the ERH source area treatment took place from April to November 2016. ERH was implemented in the source area immediately beneath and next to the northeast corner of the NHBB building and upgradient of the wetlands and the PRB wall (see Figure 3). Based on the Site's 2021 Long-Term Monitoring Plan (LTMP), groundwater VOC concentrations were lower in the treatment area during and immediately after ERH but have since increased in some wells (the Data Review Section of this FYR Report provides more information).

The 2010 AROD called for in-situ enhanced bioremediation of contaminated soil and groundwater within the TI Waiver Area that have total VOC concentrations greater than 1,000 micrograms per liter (µg/L) and are located outside the thermal treatment area. An FFS work plan for a source area under the highbay portion of the NHBB building is being developed. Additionally, to further delineate high concentrations of VOCs, a membrane interface probe and hydraulic profiling tool (MIHpt) study was performed on the northern side of the building and within and north of the ERH treatment area. Study results are discussed in the Data Review section of this FYR Report.

A 2018 report evaluating PRB performance found that it was not effectively treating the plume at any place along the length of the PRB, regardless of the influent concentrations and gradients. PRB monitoring results are discussed further in the Data Review section of this FYR Report. Construction of a replacement PRB is expected to begin in early 2024.

Vapor Intrusion

The 2013 FYR Report found that there was insufficient data to evaluate the sitewide protectiveness of the remedy due to the vapor intrusion pathway at the NHBB building. Subsequently, NHBB voluntarily implemented soil vapor extraction (SVE) as a presumptive remedy. The SVE system was intended to remove chlorinated compounds from the vadose zone and mitigate the potential for vapor intrusion of VOCs into indoor air by establishing a sub-slab vacuum under the highbay area of the building. The SVE system has been operating since March 2014. Current vapor intrusion data are discussed in the Data Review section of this FYR Report.

Institutional Controls

The 1989 ROD required institutional controls, including restrictions on the use of the South Well, to ensure that groundwater in the zone of contamination will not be used as a drinking water source until target cleanup levels are met. The 1997 ESD further required placement of deed restrictions on the NHBB property to prohibit groundwater extraction for purposes other than the remedial action unless the extracted groundwater meets or is treated to appropriate standards in effect at the time of extraction and the extraction does not adversely affect the remedial action.

NHBB placed the required deed restrictions on the property in October 1999. In May 2009, the town of Peterborough established a groundwater protection zoning overlay district (Groundwater Protection District D) in Chapter 245 (Zoning) of the Peterborough Code to prohibit groundwater use across the Site. The boundary has been set about 1,000 feet beyond the extent of contamination, as determined by chemical analyses of the groundwater at the Site. Figure C-1 in Appendix C provides a map of Groundwater Protection District D.

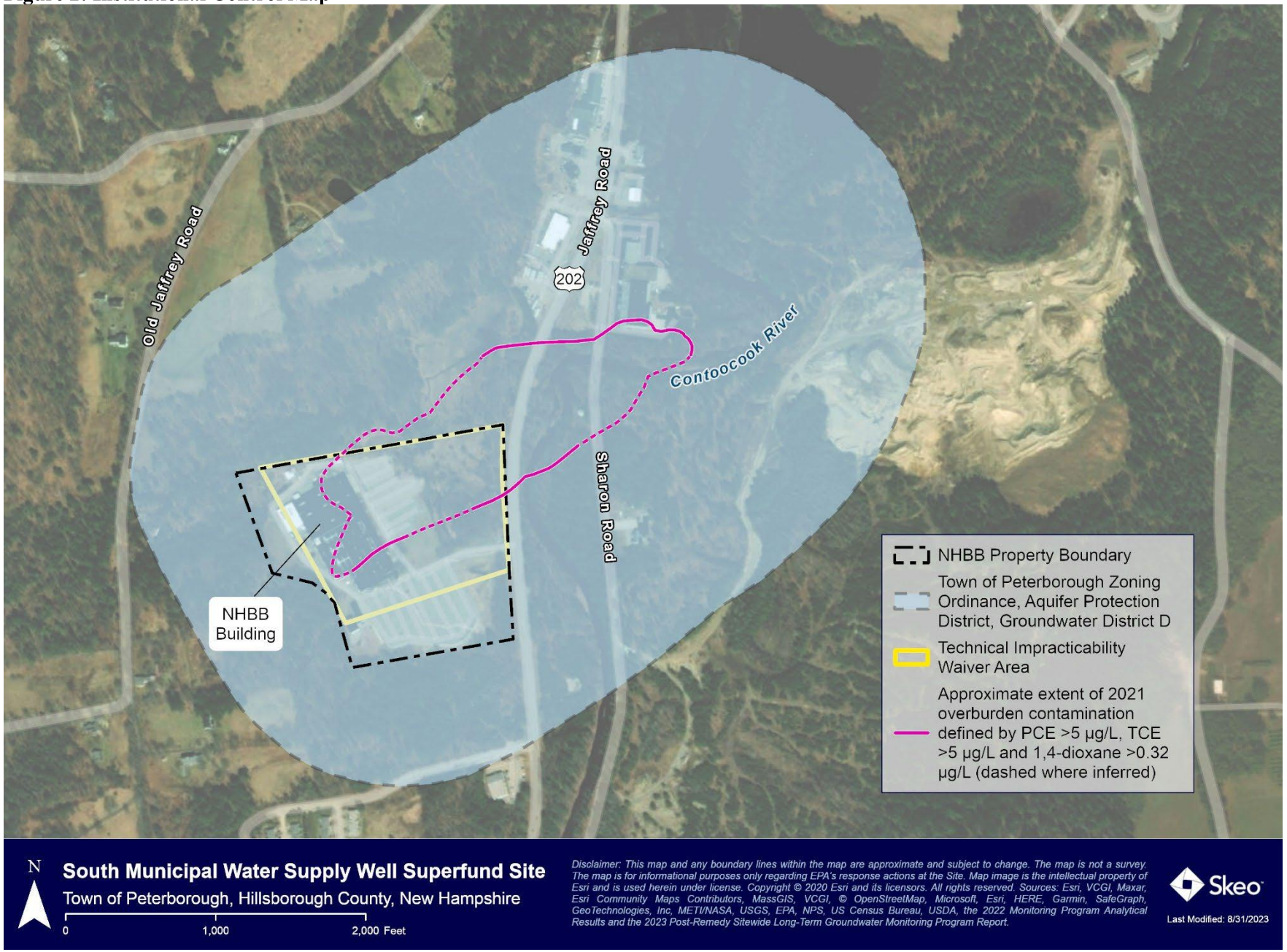
The 2010 AROD required monitoring and maintenance of existing institutional controls that regulate the pumping or use of groundwater within the established groundwater protection overlay district.

Table 2 summarizes the required institutional controls and their status.

Table 2: Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	NHBB Property	Prohibit groundwater use.	Deed Restriction recorded in the Hillsborough County Registry of Deeds Book 6171, Page 1713 October 21, 1999
			Multiple (Figure 2)	Prohibit groundwater use.	Town of Peterborough Zoning Ordinance, Aquifer Protection District, Groundwater District D (May 12, 2009)

Figure 2: Institutional Control Map



Systems Operations/Operation & Maintenance (O&M)

O&M activities at the Site includes semi-annual monitoring of groundwater (which is discussed in the Data Review section of this FYR Report) and operation of the SVE system, which mitigates vapor intrusion risk at the NHBB building. NHBB voluntarily implemented the SVE system and operates and maintains it. The SVE system receives inspection and monitoring visits at least once a month, in addition to other inspections, maintenance and repairs as needed. Throughout the FYR period, the system has been running at least 94% of the time and maintained a vacuum beneath the highbay area slab. The system has removed over 1,600 pounds of VOCs since it began operating in 2014.

III. PROGRESS SINCE THE PREVIOUS REVIEW

Table 3 includes the protectiveness determinations and statements from the previous FYR Report. Table 4 includes the recommendations from the previous FYR Report and the current status of those recommendations.

Table 3: Protectiveness Determinations/Statements from the 2018 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The Site is protective of human health and the environment in the short-term because: the Town of Peterborough's aquifer protection zoning overlay district was reestablished in 2009; the Site and adjacent areas are served by a municipal water supply system which prevents any current direct exposures to contaminated groundwater present at the Site; indoor air studies performed to evaluate vapor intrusion do not indicate an unacceptable human health risk provided the existing engineering controls are maintained. However, in order for the Site to be protective in the long-term, it must be demonstrated that the selected remedy is preventing the migration of contamination beyond the TI Waiver Area. Specifically it must be demonstrated that: the PRB wall is effective; vapor intrusion at the former SDE building and the Strang residence is not a concern; contaminant transport in bedrock at the TI Waiver Area boundary is below the groundwater cleanup goals, additional source areas upgradient of the thermal treatment zone are adequately addressed; the current remedy is adequately mitigating PCE, TCE and 1,4-dioxane migration, implementation of the in-situ enhanced bioremediation component of the remedy is feasible; and PFAS [per and polyfluoroalkyl substances] does not exist at the Site above acceptable levels. In addition, it must be demonstrated that the aquifer outside the TI Waiver Area has been restored to drinking water quality, and vapor intrusion does not present an unacceptable human health risk in the absence of engineering controls.

Table 4: Status of Recommendations from the 2018 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	PRB Wall is not preventing the migration of contamination from within the TI Waiver Area into other portions of the aquifer, the dilute plume area, and overlying structures to the extent practicable.	Further assessment of the PRB wall is needed to evaluate and understand the construction of the wall, specifically that the iron has been emplaced as intended by the design including the orientation of the panels (i.e., vertically as opposed to horizontally), and thickness. Additional information is also required to verify the iron is reactive.	Completed	PRB performance monitoring indicated that the PRB was not effectively treating the plume at any place along the length of the PRB, regardless of the influent concentrations and gradients. Construction of a replacement PRB is expected to begin in 2024.	9/1/2019

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Since the PRB Wall is not currently preventing the migration of contamination as stated in the issue above, vapor intrusion in two nearby downgradient structures (former SDE building and Strang residence) may be an on-going issue.	Perform studies to determine if vapor intrusion at the former SDE building and the Strang residence (these two structures were not occupied at the time of the 2018 FYR) are an issue of concern.	Completed	PRP contractors completed a soil gas survey at the former SDE building in 2019. The Strang residence remains unoccupied. Results are discussed in the Data Review section of this FYR Report.	2/4/2020
1	Additional source areas upgradient of the thermal treatment zone.	Perform additional studies to identify and delineate the additional source areas and perform a Focused Feasibility Study to identify remedial options for the identified source areas.	Ongoing	The PRPs completed investigations in 2020 north of the ERH treatment area. However, more source delineation investigation is planned.	Not applicable
1	Contaminant transport in deep overburden/bedrock is not well understood.	Finalize plans for additional bedrock investigations and begin the work.	Ongoing	Potable bedrock wells have been assessed (the Data Review section of this FYR Report provides more information). Discussions regarding additional bedrock investigations are ongoing.	Not applicable
1	PCE, TCE, and 1,4-dioxane above cleanup goals south of the PRB Wall. PRB Wall does not mitigate 1,4-dioxane.	Continue to monitor contaminant concentrations and evaluate the need for changes to the existing monitoring well network to better characterize contaminant distribution and adequacy of the existing remedy to contain contaminants above cleanup goals at the TI Waiver boundary.	Completed	Semi-annual sampling is conducted according to the post-remedy sitewide LTMP, which PRP contractors submitted in August 2019 and EPA approved with conditions in March 2020. The LTMP was revised in March 2021. A pilot study work plan for in-situ enhanced bioremediation is being developed. Additional remedial technologies will be evaluated for the treatment of 1,4-dioxane and documented in the highbay area FFS.	3/11/2020
1	Additional studies are needed to demonstrate that the full-scale application of in-situ enhanced	Perform studies after aquifer parameters return to ambient conditions.	Ongoing	A pilot study work plan for in-situ enhanced bioremediation and a pre-design investigation	Not applicable

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
	bioremediation is feasible at this Site. These studies will be started after aquifer parameters (e.g., temperature) return to ambient conditions post thermal treatment.			work plan are being developed.	
1	It is unknown if PFAS were released at the Site.	Include PFAS in an upcoming groundwater monitoring event to determine if these compounds are associated with the Site.	Completed	PRP contractors sampled for PFAS in 2018 and 2023. Results are discussed in the Data Review section of this FYR Report.	1/8/2019

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

EPA issued an online news release in January 2023 to announce that the FYR was underway. A copy of the news release is included in Appendix D. The results of the review and the completed FYR Report will be made available on EPA's site profile page at www.epa.gov/superfund/southmuni.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below. Appendix E includes the completed interview forms.

Christopher Rawnsley, Director of Safety, Environment, and Sustainability at NHBB, said that many remedial activities at the Site were successful in mitigating risk and reducing contaminant mass, but that the failure of the 2016 PRB installation prevents the overall remedial action from being a success. He stated the Site affected the community with the loss of the South Well, but that the Town had not had a water supply deficiency and he feels there have been no other significant effects on the community. PRP contractors Carl Elder and Rhiannon Scott of Geosyntec also stated that the PRB did not achieve its objectives, but they feel they have taken major steps forward and have more robust design for the replacement PRB.

Stephanie Monette, NHDES project manager for the Site, reported that the remedy is moving along at an appropriate speed and that agency approval of the new PRB design and forthcoming construction is a significant step towards remedial compliance at the Site. She stated that more investigations are needed for soil and groundwater in the 1ERH area, bedrock DNAPL, and emerging contaminants in the dilute plume that are not captured by the PRB.

Peterborough Town Administrator Nicole MacStay and Assistant Town Administrator Seth MacLean stated that there are no current plans to use the South Well and the Town has alternate water sources. They felt up to date on Site activities and remedial progress and felt that EPA has good communication with community members. They noted that there are often local concerns about the Site and the neighborhood Selectman replies to complaints and explains the Superfund process and the extent of contamination.

Representatives from Lionheart Classical Academy declined an interview because the school is so new that they did not yet have information on the Site and did not receive information from the previous building owner.

Data Review

Groundwater monitoring is conducted semi-annually. Monitoring results are used to evaluate the progress of the remedial actions conducted to date. As previously discussed, construction of a new PRB is expected to begin in 2024. A pilot study work plan is being developed for in-situ bioremediation. Given the status of the remedy, this data review section summarizes the current state of contamination at the Site, without evaluating progress toward RAOs since all of the remedies have not yet been implemented. In general:

- There are no known currently completed exposure pathways to remaining groundwater contamination.
- There is considerable uncertainty about the extent of contamination north and northwest of the ERH area and outside of the TI Waiver Area.
- VOC concentrations in the ERH areas initially decreased immediately after the 2016 action but have rebounded in the following years, likely due to DNAPL sources that remain outside of the ERH treatment area.
- Future groundwater monitoring data will determine the effectiveness of the implementation of the replacement PRB and in-situ bioremediation in reducing groundwater contamination within the TI Waiver Area.
- Sampling of bedrock aquifer potable wells found no MCL exceedances. However, extent of contamination and contaminant transport in the bedrock and deep overburden aquifers in the area of the current plume is not well understood. A Work Plan for Bedrock Groundwater Investigation was submitted by the PRP in March 2015 and resubmitted in October 2019. The Work Plan has been reviewed and discussions regarding bedrock investigations are ongoing.

Long-Term Monitoring Program (LTMP)

The LTMP consists of two monitoring events performed each year, during which groundwater elevation, geochemical parameters, and water quality samples are collected from a network of monitoring wells (see Figure 3) in the overburden aquifer. Samples are analyzed for VOCs, including all site COCs (see Table 1). Table F-1 in Appendix F provides full analytical results from March 2023 sampling.

Figures F-1 through F-4 in Appendix F show the potentiometric surface at different depths in the overburden aquifer. Figures F-5 through F-13 in Appendix F include current plume maps for PCE, TCE and 1,4-dioxane in the upper, middle and lower surficial aquifers.

ERH Treatment Area

In 2016, PRP contractors performed the ERH remedy within and outside the northeast corner of the NHBB building. The designed treatment area was based on 2007, 2012, and 2013 investigations to define the extent of DNAPL. Concentrations of VOCs in ERH monitoring wells generally decreased during and/or immediately after the remedial action but have increased in subsequent years to levels that may indicate the presence of DNAPL, as shown in time-concentration graphs in Figure F-14 in Appendix F. In wells 1ERH-A, 1ERH-B, 3ERH-A and 10ERH-B, TCE and/or PCE concentrations are higher than before ERH treatments took place.

The 2016 ERH treatment successfully met temperature benchmarks throughout the treatment area and increased groundwater VOC concentrations would be unlikely as groundwater cools because chlorinated solvents are most soluble at higher temperatures. Therefore, the increases in VOC concentrations seen in the ERH treatment area are likely from DNAPL sources that remain outside of the former thermal treatment area.

In 2019, PRP contractors performed a MIHpt investigation in the ERH treatment area. As seen in Figure F-15 in Appendix F, DNAPL was not suspected within the ERH treatment area, but “suspected” and “potential” DNAPL was identified in several locations north of the treatment area. There is considerable variability in the VOC concentration data at the affected monitoring wells, but it does not appear that the concentrations are decreasing overall. Thus, there is no indication that the source strength is decreasing. Definitive data, such as from soil cores, is needed in this area to estimate contaminant mass to determine the appropriate remedial technology. There are also no monitoring wells in this area to determine the extent of VOCs in the upgradient direction. The vertical extent of contamination is not defined in the ERH area, as there is still a significant concentration of PCE in the lower aquifer well GZH-4L (110 µg/L in October 2022 and 91 µg/L in March 2023).

In addition to the rising groundwater concentrations at the north side of the former ERH treatment area, there are also increased concentrations at the south side of the former ERH treatment area, most notably at monitoring wells 2ERH-A and 12ERH-A. These increasing concentrations appear to be coming from the PCE/TCE source zone in the area of soil boring PSB-15 (see Figure F-16 in Appendix F). Investigations to identify the most appropriate remedial technique in this area are ongoing.

Concentrations of daughter products from the TCE and PCE reductive dechlorination, cis-1,2-DCE and vinyl chloride, have been increasing in the ERH treatment area and have become dominant over the parent compounds in some wells. It is unlikely that reducing bacteria are active after the increased temperatures caused by the ERH treatment. Further study is needed to determine what is controlling the observed reductive dechlorination.

PRB Area

The 2018 FYR Report noted that, based on available groundwater data, the PRB wall was not effective in treating the plume. Groundwater monitoring results indicate that VOC concentrations downgradient from the PRB continue to exceed cleanup levels, indicating that the PRB continues to not meet its treatment objectives. Construction of a new PRB is expected to begin in 2024.

Groundwater monitoring results indicate groundwater concentrations in the PRB area have generally returned to stable levels following a dynamic period from 2016 to 2018. However, as the plume in the ERH treatment area is re-established, concentrations in the PRB area may be expected to increase. High VOC concentrations may reduce the effectiveness and/or the life of the wall.

As discussed above, PCE and TCE daughter products cis-1,2-DCE and vinyl chloride concentrations are increasing in some wells in the PRB area, indicating that reductive dechlorination is taking place.

Table 5 shows maximum VOC concentrations from the October 2022 and March 2023 sampling events, which support the need for ongoing remedial actions.

Table 5: Maximum Concentrations of Groundwater COCs in October 2022 and March 2023

COC	Groundwater Cleanup Level (µg/L)	Maximum Concentrations in October 2022 (µg/L)	Maximum Concentrations in March 2023 (µg/L)	Location
PCE	5	**49,000**	**120,000**	ERH treatment area
TCE	5	**7,700**	**5,000**	ERH treatment area
1,1,1-TCA	200	36	150	ERH treatment area
Cis-1,2-DCE	70	**10,000**	**940**	ERH treatment area
Trans-1,2-DCE	100	**210**	**130**	ERH treatment area
1,1-DCE	7	**1,000**	**640**	ERH treatment area
1,1-DCA	81	9.8 J	2.3 J	ERH treatment area
Vinyl Chloride	2	**2,700**	**310**	ERH treatment area
1,4-Dioxane	3	**12.8**	**19.6**	PRB compliance boundary

Notes:
Sources: The Site's 2010 AROD, data in the 2022 October Data Submittal, Table 2, and data in the 2023 March Data Submittal, Table 2.
Bold values exceed applicable cleanup goal.
J = The concentration was below the reporting limit and is estimated.

Outside of TI Waiver Zone

The TI Waiver Area boundary is downgradient of the PRB area and cleanup levels are applicable outside of the TI Waiver boundary. As with the PRB area, groundwater concentrations are stable or decreasing in the area after fluctuations in 2016 to 2018, although there are a few wells and/or constituents that have increasing concentrations.

There is considerable uncertainty in the horizontal extent of the PCE, TCE and 1,4-dioxane plumes, as expressed by the dashed portions of the contours shown on Figures F-5 through F-13 in Appendix F. Of particular concern is the fact that PCE concentrations exceeding the MCL outside of the TI Waiver zone, are not defined. More characterization is needed to define the extent of the VOC plumes.

1,4-dioxane is present at concentrations above the cleanup level in the dilute plume, beyond the TI Waiver boundary. Because 1,4-dioxane is not treated by iron in a PRB, the concentrations downgradient of the TI Waiver Area boundary may continue to increase if the source is not remediated.

The chlorinated VOC and 1,4-dioxane plumes intersect the area of the Contoocook River. However, the 1989 ROD notes that due to steep gradients east of the Contoocook River, there appears to be little interconnection in the Site area between the river and the aquifer. Additionally, no VOCs were detected in surface water collected from the Contoocook River during the Remedial Investigation.

During and prior to 2021 LTMP events, groundwater elevation measurements were collected after sampling. The 2021 LTMP report states that, per EPA comments, water-level measurements in future sampling events will be collected prior to sampling wells.

Per and Polyfluoroalkyl Substances (PFAS) Sampling

In 2018, NHBB collected and analyzed groundwater samples from the Site for PFAS. Twelve wells were sampled for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS). Seven of the 12 samples had detections of PFAS greater than the method detection limit. None of the detections exceeded the then current NHDES ambient groundwater quality standard (AGQS) for PFOS and PFOA (70 nanograms per liter [ng/L] separately or combined if both are present). The maximum concentration of PFOS detected was 8.33 ng/L and PFOA was 3.82 ng/L (both at 1ERH-B). These concentrations are below the current NHDES AGQS of 15 ng/L and 12 ng/L for PFOS and PFOA, respectively. However, the maximum PFOS detection is above current EPA regional screening level (RSL) of 4 ng/L, using a hazard index of 0.1. The PFOA 3.82 ng/L concentration in 1ERH-B is below the current EPA RSL of 6 ng/L, using a hazard index of 0.1.

In March 2023, the 12 wells were sampled again, and analysis additionally included perfluorononanoic acid (PFNA), Ammonium salt of hexafluoropropylene oxide dimer acid (HFPO-DA), perfluorohexane sulfonic acid (PFHxS) and perfluorobutane sulfonic acid (PFBS). Analytical results are included in Appendix F, Table F-2. PFOS, PFOA, PFBS and PFHxS were detected, but did not exceed NHDES AGQS or EPA RSLs. HFPO-DA was not detected above the method detection limit. PFNA was not detected above the method detection limit except for a low concentration in one well (0.322 “J” ng/L, an estimated value due to concentration below laboratory reporting limit in PRB-N40), which was below the EPA RSL of 6 ng/L (using hazard index of 0.1) and the NHDES AGQS of 11 ng/L.

Sampling of Privately Owned Bedrock Wells

A survey and sampling of privately-owned bedrock wells was completed in 2021. Results from this sampling program indicate that Site VOCs were not detected in the 25 wells sampled. Four property owners declined access for well sampling and six property owners did not respond to well sampling requests. Three upgradient or cross-gradient properties were identified later in the screening process; however, given the data from the wells that were sampled, EPA and NHDES agreed that the additional parcels did not need to be investigated. Water samples were analyzed for all Site COCs. The only COC detected was trans-1,2-DCE at a concentration of 0.3 µg/L, which is well below the cleanup goal of 100 µg/L. No other COCs were detected in privately owned bedrock wells.

Vapor Intrusion

A soil vapor extraction and sub-slab depressurization system have been operating at the NHBB building beneath the highbay portion of the manufacturing plant since March 2014, which mitigates on-Site vapor intrusion risk. The highbay area is on the northeast side of the building and includes a tool room and machining operations.

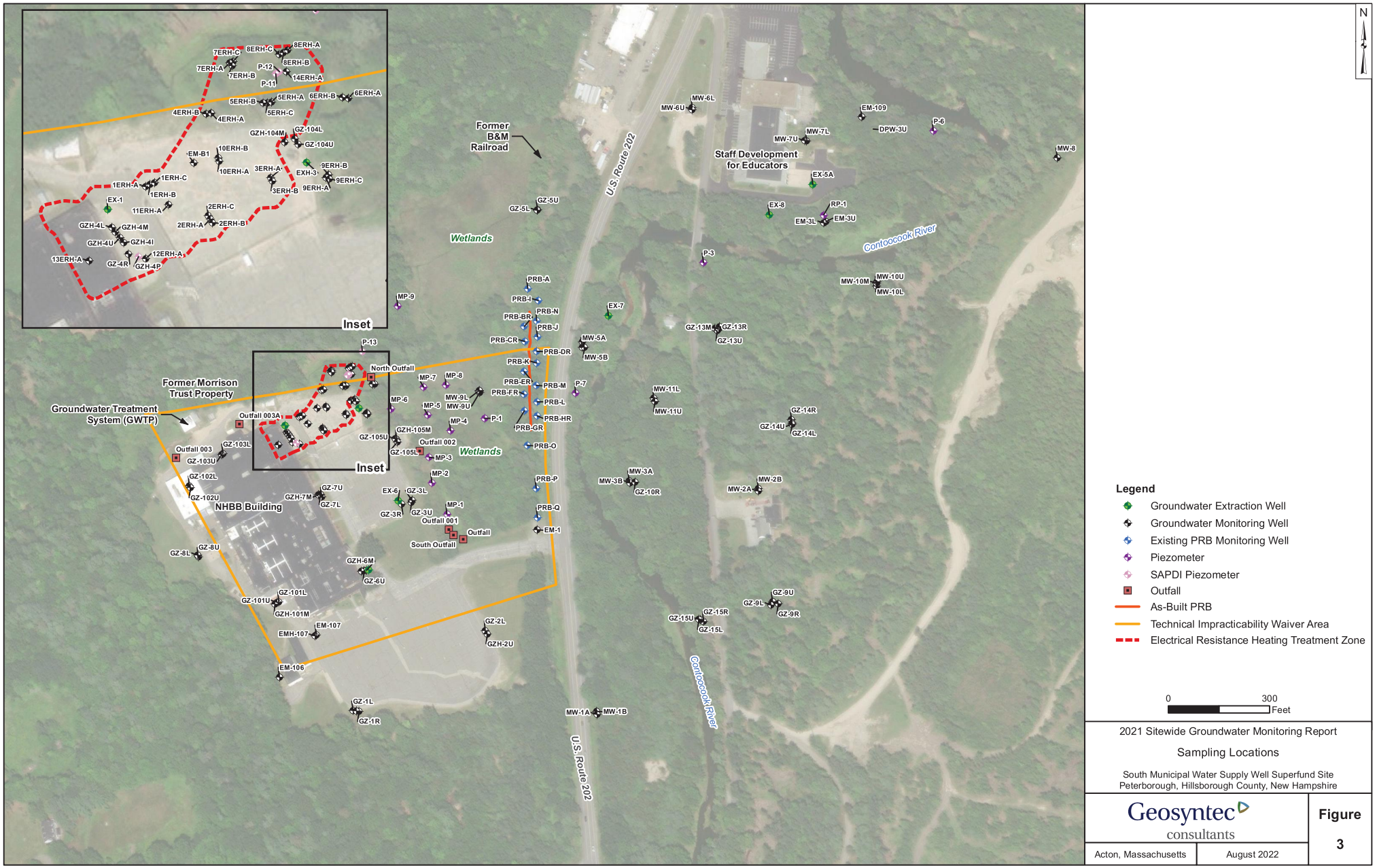
Two structures are located above the leading edge of the plume – a charter school (Lionheart Classical Academy; formerly the SDE building) and one residence. In 2019, the potential for vapor intrusion was evaluated using exterior soil gas and sub-slab soil gas sampling at the Lionheart Classical Academy building, which at that time was in commercial use. Soil gas samples were collected from the three existing exterior soil gas probes on the property and two existing sub-slab soil gas probes within the building. Detections of VOCs in the soil gas samples were all below NHDES waste management vapor intrusion screening levels and EPA vapor intrusion screening levels (VISLs) developed for commercial land use.

In March 2023, after being notified that the building was in use as a school, EPA requested additional measures to appropriately evaluate vapor intrusion risk at Lionheart Classical Academy because of the change in use.

In response, PRP contractors compared existing 2010 and 2019 TCE, PCE and vinyl chloride soil gas data to residential VISLs. These concentrations were below residential VISLs (which would also be protective for the school scenario), as shown in Table F-3 in Appendix F. Annual soil gas sampling is planned until an effective replacement PRB is in place and groundwater concentrations near the Lionheart Classical Academy show a decreasing trend. Further discussions regarding additional monitoring for potential vapor intrusion are ongoing.

As of the FYR site visit in 2023, the downgradient residential building is unoccupied, which was also the case during the 2019 soil gas evaluation. Thus, there are no receptors to complete the vapor intrusion pathway at this unoccupied residence.

Figure 3: Groundwater Sampling Locations



Q:\GISProjects\BR0556_NH_BB\MXD\2021\June_Report\Figure 3 - Sampling Locations.mxd 8/25/2022 11:00:59 AM

Source: Figure 3, 2021 LTMP Report

Site Inspection

The site inspection took place on 4/17/2023. In attendance were Valerie Jurgens (EPA RPM), Stephanie Monette (NHDES), Rhiannon Scott (PRP contractor Geosyntec) and Kirby Webster (EPA support contractor Skeo). The purpose of the inspection was to assess the protectiveness of the remedy. Appendix G includes photographs from the site inspection. Appendix H includes the completed site inspection checklist.

Site inspection participants met in the lobby of the NHBB building located at 175 Jaffrey Road in Peterborough for a health and safety briefing. Access at the Site is closely monitored at an entry checkpoint in the building. Site inspection participants toured the property grounds, including the voluntarily placed SVE system components, the location where ERH was conducted, and the location where the original PRB wall was constructed, which is also the location where the new PRB wall will be constructed in early 2024. The groundwater treatment system building is still present even though the groundwater treatment system is no longer operating. The building is in good condition.

The Site is in generally good condition. Some groundwater monitoring wells had been damaged over the winter, likely by a snowplow when they were not visible under snow cover. The damaged monitoring wells were reportedly repaired following the inspection. No trespassing or vandalism was apparent. No protectiveness issues were observed. The PRP contractor was beginning activities for the installation of the PRB wall, including changing some stick-up groundwater monitoring wells to flush-mounted wells in the planned staging area. Site inspection participants discussed where the access road is planned, and other activities related to the PRB installation.

Two downgradient structures are in areas potentially above the downgradient groundwater plume. The former SDE building is now in use as a school (Lionheart Classical Academy). The residence remains uninhabited.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

No. The remedy is not functioning as intended. The 2010 AROD selected the PRB at the TI Waiver Area boundary, in-situ thermal treatment for the source areas, and in-situ bioremediation following the thermal treatment. The PRB wall, installed in 2014, is not effectively treating the plume at any place along the length of the PRB, regardless of the influent concentrations and gradients. VOC concentrations in the ERH areas initially decreased immediately after the 2016 action but have rebounded in the following years, likely due to DNAPL sources that remain outside of the ERH treatment area. Construction of a replacement PRB is expected in 2024. A pilot study work plan for in-situ bioremediation is being developed. The first phase of the in-situ bioremediation pre-design investigation is expected to be completed in the fall of 2023.

Initial remedies that began in 1994 for source areas and groundwater included the VES, which was discontinued in 1997 after EPA issued the second ESD, and the groundwater extraction and treatment system, which operated until 2014 when the PRB was installed.

Groundwater quality at the Site continues to be impacted. During the October 2022 and March 2023 sampling events, cleanup levels for all COCs except 1,1,1-TCA and 1,1-DCA were exceeded. Exceedances occur in the upper, middle and lower overburden wells. There is considerable uncertainty in the horizontal and vertical extent of the PCE, TCE and 1,4-dioxane plumes. Additional delineation, especially under the Site building and near/in the ERH treatment area, is necessary to understand the full extent of contamination.

Additional source areas outside of the ERH treatment area have been identified north of the ERH treatment area near monitoring well 1ERH as well as south of it, near 12ERH and under the highbay area of the building near plant soil boring PSB-15. Additionally, the 1,4-dioxane plume map (see Figure F-11, Appendix F) indicates a potential 1,4-dioxane source area near the southwest corner of the NHBB building. Definitive data should be

collected in all of these source areas to delineate them and estimate contaminant mass, as well as to identify appropriate remedial techniques. Since 1,4-dioxane is not treated by the iron in the PRB, the ability of remedial techniques to remediate 1,4-dioxane should be evaluated.

Institutional controls at the Site include deed restrictions on the NHBB property restricting the use of groundwater and a town ordinance. The deed restriction prohibits the use of groundwater on the property unless it is treated to EPA-specified standards and does not adversely affect the remedy. The town ordinance prohibits groundwater use within 1,000 feet of the extent of site-related contamination.

The SVE system, which mitigates vapor intrusion risk in the NHBB building by removing chlorinated compounds from the vadose zone and establishing a sub-slab vacuum under the highbay area of the building, has been running over 90% of the time since 2014. It has maintained a vacuum under the highbay slab throughout the FYR period and has removed over 1,600 pounds of VOCs since operation began in 2014.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Question B Summary:
No. There have been changes in toxicity values, exposure assumptions, exposure pathways and methods of evaluating risk since the 1989 ROD and 2010 AROD were issued, as discussed below. The RAOs selected for the Site are still valid. The changes as described below are not expected to alter the protectiveness of the remedy because groundwater at the Site is not in use and institutional controls are in place and effective in preventing future exposures to contaminated groundwater. Remedy components continue to be implemented.

Changes in Standards and To Be Considered Criteria (TBCs)
New standards (federal or state statutes and/or regulations), as well as new TBC guidances, should be considered during the FYR process as part of the protectiveness determination. Under the NCP, if a new federal or state statute and/or regulation is promulgated or a new TBC guidance is issued after the ROD is signed, and, as part of the FYR process it is determined that the standard needs to be attained or new guidance procedures followed to ensure that the remedy is protective of human health and the environment, then the FYR should recommend that a future decision document be issued that adds the new standard as an ARAR or guidance as a TBC to the remedy.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new…[standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, pp. 1-56.)

Site groundwater cleanup levels were selected in the 1989 ROD and amended in the 2010 AROD based on EPA MCLs and NHDES AGQSs, if no MCL was available. Soil cleanup levels were based on the New Hampshire Method 1 Category S-1 soil standard. An NHDES review of site cleanup levels, ARARs and standards is included in Appendix I.

PFAS (Federal)
In May 2022, EPA issued updated noncancer reference dose (RfD) values for several PFAS compounds, which result in the following RSLs at hazard quotient (HQ) target 0.1:

- PFOA: 6 ng/L (equivalent to parts per trillion [ppt])
- PFOS: 4 ng/L
- PFNA: 6 ng/L
- PFHxS: 40 ng/L
- HFPO-DA (Gen-X): 6 ng/L

The RfD values for PFOA, PFOS, PFNA and PFHxS are based on Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) for ingestion exposure.

The RfD value for HFPO-DA (Gen-X) is based on a chronic oral RfD from EPA Office of Water which is 3E-06.

In May 2021, EPA issued an updated noncancer RfD for PFBS. PFBS has a chronic oral RfD of 3E-04. The RSL for PFBS is 600 ng/L.

In December 2022, EPA released a new oral RfD of 1.0E-03 milligrams per kilogram per day (mg/kg-day) for perfluorobutanoic acid (PFBA) based on a new Integrated Risk Information System (IRIS) value. Previously, no RfD was available for PFBA. The RSL for PFBA is 1,800 ng/L.

In April 2023, EPA released a new oral RfD of 5.0E-04 mg/kg-day for perfluorohexanoic acid (PFHxA) based on a new IRIS value. Previously, no RFD was available for PFHxA. The RSL for PFHxA is 990 ng/L.

PFAS (State)
In July 2020, New Hampshire promulgated state MCLs for the following four PFAS, individually or combined, into the state's Safe Drinking Water Act:

- PFOA: 12 ppt
- PFOS: 15 ppt
- PFHxS: 18 ppt
- PFNA: 11 ppt

Current state law requires that AGQS be the same value as any MCL established by NHDES, and also that they be at least as stringent as health advisories set by EPA.

At this time EPA has made no determination of whether these state standards will need to be added as an ARAR for this Site. They should, however, be used as screening values for PFAS compounds, along with the RSLs. For purposes of this FYR, EPA has evaluated the PFAS data collected against EPA's RSLs and the state's PFAS MCLs.

PFAS (Summary)

PRP contractors sampled a subset of 12 wells for PFOA and PFOS in December 2018. PFOS was detected in five wells. Detected concentrations ranged from 1.00 ng/L to 8.33 ng/L. Concentrations in two wells exceeded the EPA RSL, but the AGQS was not exceeded. PFOA was detected in eight wells, with detected concentrations ranging from 0.873 ng/L to 4.29 ng/L which were below both the RSL and AGQS. Groundwater samples were not analyzed for other PFAS compounds during the 2018 sampling event.

In March 2023, the 12 wells were sampled again, and analysis additionally included PFNA, HFPO-DA, PFHxS and PFBS. PFOA was detected in all 12 sampled wells at concentrations ranging from 0.428 (estimated) ng/L to 4.81 ng/L, which is less than the RSL (6 ng/L). PFOS was detected in 10 wells at concentrations ranging from

0.576 (estimated) ng/L to 1.54 (estimated) ng/L, which does not exceed the RSL of 4 ng/L. Additionally, PFBS and PFHxS were detected, but concentrations did not exceed NHDES AGQS or EPA RSLs. HFPO-DA and PFNA were not detected above the method detection limit, except for a low concentration of PFNA in one well (0.322 "J" ng/L, an estimated value due to concentration below laboratory reporting limit in PRB-N40).

Although there were exceedances of the PFOS RSL in 2018, the remedy remains protective because no one is drinking the affected groundwater and institutional controls are in place to prevent future use.

1,4-Dioxane (Federal)
Using 2013 updated IRIS toxicity information and the standard Superfund risk assessment approach, EPA's carcinogenic risk range of 10^{-6} to 10^{-4} for 1,4-dioxane equates to a concentration range of 0.46 µg/L to 46 µg/L (ppb).

1,4-Dioxane (State)
In September 2018, NHDES modified its AGQS for 1,4-dioxane from 3.0 µg/L (ppb) to 0.32 µg/L (ppb). The current site groundwater cleanup level of 3.0 µg/L (ppb) for 1,4-dioxane equates to a carcinogenic risk of 6.5 x 10^{-6}, which is still well within EPA's acceptable 10^{-6} to 10^{-4} risk range. Thus, the existing cleanup goal remains protective, and the remedy does not need to be modified to the new AGQS of 0.32 µg/L (ppb) for 1,4-dioxane at this time.

1,4-Dioxane (Summary)
1,4-Dioxane was a co-solvent used to stabilize 1,1,1-TCA-based degreaser products and was first identified at the Site in 2003. The 2010 AROD added it as a Site COC. In March 2023, concentrations of 1,4-dioxane at the Site ranged from non-detect to 19.6 µg/L (PRB-GR-25). While the Site cleanup goal and the AGQS are exceeded, the maximum concentration was detected within EPA's acceptable risk range of 10^{-6} to 10^{-4}. Isoconcentration maps of the 1,4-dioxane plume are provided in Figures F-11, F-12 and F-13 in Appendix F. The plume appears to originate near the well PSB-1, somewhat further south than those of PCE and TCE.

The PRB is not designed to treat for 1,4-dioxane. Any future FFS should evaluate each treatment technology's ability to remediate 1,4-dioxane.

The remedy remains protective because no one is drinking groundwater impacted by 1,4-dioxane and institutional controls are in place in the form of deed restrictions on the NHBB property and a town ordinance restricting groundwater use within 1,000 feet of the Site. Privately owned wells within a mile of the Site were sampled for 1,4-dioxane in 2021. 1,4-dioxane was not detected in any of the wells (detection limit of 0.144 µg/L).

Floodplain
Federal regulations at 40 CFR Part 6, Appendix A identified in the 1989 ROD and the 2010 AROD were withdrawn. Furthermore, these regulations, and therefore the current CERCLA remedy, only addressed potential floodplain impacts up to the 100-year flood elevation. Current federal floodplain regulations at 40 CFR Part 9 require a greater assessment of potential floodplain impacts, including preventing the release of contamination from waste management units and other remedial infrastructure up to the 500-year floodplain elevation. EPA has assessed potential floodplain impacts from a 500-year flood event on the replacement PRB. Because EPA has not identified any protectiveness issues at this time, we do not include a recommendation to add this requirement as an ARAR in a future determination.

Changes in Toxicity and Other Contaminant Characteristics

2022 cis-1,2-DCE Noncancer Toxicity Value
In October 2022, EPA released a noncancer reference concentration (RfC) of 4.00E-02 milligrams per cubic meter (mg/m³) for cis-1,2-DCE, based on a provisional peer reviewed toxicity value (PPRTV) screening value. Previously, no RfC was available for cis-1,2-DCE.

Cis-1,2-DCE is present in groundwater at concentrations above cleanup goals. However, protectiveness is not affected because there are no completed exposure pathways to current contamination and institutional controls are in place restricting the use of groundwater.

2022 PFBA Noncancer Toxicity Value
In December 2022, EPA released a new oral RfD of 1.0E-03 mg/kg-day for PFBA based on a new IRIS value. Previously, no RfD was available for PFBA. While PFBA has not been sampled for at the Site, institutional controls are in place restricting the use of groundwater; therefore, detections would not impact protectiveness.

2022 PFOA/PFOS/PFNA/PFHxS non-cancer toxicity values

In May 2022, EPA released updated oral reference doses (RfDs) for PFOA, PFNA, PFOS, and PFHxS, based on the ATSDR Minimal Risk Level (MRL). The new RfDs are as follows:

- PFOA 3E-06 mg/kg-da
- PFOS 2E-06 mg/kg-day
- PFNA 3E-06 mg/kg-day
- PFHxS 2.0E-05 mg/kg-day

These new values indicate that PFOA and PFOS are more toxic from non-cancer health effects and would result in an increased non-cancer risk. Values for PFNA and PFHxS were not previously available, but if detected would result in increased non-cancer risk.

Potential estimated health risks from PFOA, PFOS, PFNA, and PFHxS would likely increase total site risks due to groundwater exposure, however there is no current groundwater exposure at the Site and institutional controls are in place.

In 2023, PFOA was detected in all 12 sampled wells at concentrations ranging from 0.428 (estimated) ng/L to 4.81 ng/L, which is less than the RSL (6 ng/L). Therefore, there is no impact to protectiveness.

In 2023, PFOS was detected in 10 wells at concentrations ranging from 0.576 (estimated) ng/L to 1.54 (estimated) ng/L, which does not exceed the RSL of 4 ng/L. During the 2018 sampling event, two wells exceeded the EPA RSL with the maximum concentration detected of 8.33 ng/L. The remedy remains protective due to incomplete exposure pathways and institutional controls in place to prevent groundwater future use.

In 2023, PFNA was detected at an estimated concentration of 0.322 ng/L, which is below the RSL of 6 ng/L. Therefore, there is no impact to protectiveness.

In 2023, PFHxS was detected in six wells with a maximum estimated concentration of 0.909 (estimated) ng/L, which is below the RSL of 40 ng/L. Therefore, there is no impact to protectiveness.

2022 HFPO-DA (Gen-X) Noncancer Toxicity Value
In May 2022, EPA released an oral RfD of 3.0E-06 mg/kg-day for HFPO-DA, also known as Gen-X, based on an oral RfD available from EPA's Office of Water. Previously, no RfD was available for HFPO-DA.

HFPO-DA (Gen-X) was not detected above the laboratory detection limit of 20.7 ng/L during 2023 groundwater sampling event. Therefore, there is no impact to protectiveness.

2021 PFBS Noncancer Toxicity Value
In May 2021, EPA released an oral RfD of 3E-04 mg/kg-day, based on an EPA PPRTV (USEPA, 2021a). The new value indicates that PFBS is more toxic from noncancer health effects and would result in an increased noncancer risk.

In 2023, PFBS was detected in 10 wells with a maximum estimated concentration of 1.33 (estimated) ng/L, which is below the RSL of 600 ng/L. Therefore, there is no impact to protectiveness.

2021 Ethyl Tertiary Butyl Ether (ETBE) Cancer and Noncancer Toxicity Values
In August 2021, EPA finalized a noncancer oral RfD and a noncancer inhalation RfC for ETBE based on new IRIS toxicity values. Additionally, EPA finalized a value for inhalation unit risk (IUR), based on a new IRIS cancer value. Previously, no toxicity values were available for ETBE.

ETBE was not detected at the site above the laboratory detection limit of 0.18 µg/L during the 2021 long-term groundwater monitoring event, which is below the current RSL of 70 µg/L. Therefore, there is no impact to protectiveness.

2021 tert-Butyl Alcohol (tBA) Cancer and Noncancer Toxicity Values
In August 2021, EPA finalized a noncancer oral RfD and a noncancer inhalation RfC for tBA based on new IRIS toxicity values. Additionally, EPA finalized an oral slope factor for tBA based on a new IRIS cancer value. Previously, no toxicity values were available for tBA.

During the 2021 groundwater monitoring events, tBA was detected in four wells at concentrations ranging from 1.6 µg/L to 9.8 µg/L, which is less than the current RSL of 150 µg/L. Therefore, there is no impact to protectiveness.

2021 Updated Recommendations on the Use of Chronic or Subchronic Noncancer Values
In 2021, a memorandum was released from EPA's Office of Land and Emergency Management (OLEM) regarding the use of subchronic toxicity values rather than the chronic noncancer value for 19 chemicals. This recommendation is based on OLEM's Human Health Regional Risk Assessment Forum's (OHHRRAF) Toxicity Workgroup evaluation of the toxicity of 32 chemicals. The OHHRRAF Toxicity Workgroup identified 21 oral and 11 inhalation noncancer toxicity values where a subchronic toxicity value was lower than its corresponding chronic toxicity value. After review of relevant information, the OHHRRAF recommended use of the subchronic toxicity value rather than the chronic value for 19 of the 32 chemicals, as follows below.

- Subchronic inhalation RfC selected for the following chemicals (Chemical Abstracts Service Registry Number [CASRN]):
    - Acrylic acid (79-10-7)
    - 2-Ethoxyethanol (110-80-5)
    - Ethyl-chloride (75-00-3)
    - 2-Methoxyethanol (109-86-4)
    - Vinyl chloride (75-01-4)
- Subchronic oral RfD selected for the following chemicals (CASRN):
    - Acrylonitrile (107-13-1)
    - Allyl alcohol (107-18-6)
    - Atrazine (1912-24-9)
    - Bromodichloromethane (75-27-4)
    - Cadmium (7440-43-9)
    - p-Chloroaniline (106-47-8)
    - p-Cresol (106-44-5)
    - Ethyl acetate (141-78-6)
    - Ethylbenzene (100-41-4)
    - Ethylene glycol (107-21-1)
    - Heptachlor (76-44-8)
    - Hexachlorobenzene (118-74-1)
    - Hexachlorocyclohexane, gamma (58-89-9)
    - 1,2,4,5-Tetrachlorobenzene (95-94-3)

OHHRRAF recommended the chronic inhalation noncancer value for the following chemicals: ammonia, chlordane, 1,1-dichloroethylene, methyl tert-butyl ether, nitromethane and vinyl acetate.

OHHRRAF recommended the chronic oral noncancer value for the following chemicals: acrylamide, acrylic acid, 1,1-biphenyl, cyclohexanone, endosulfan, ethylene glycol monobutyl ether and pentachlorophenol.

The following constituents were not detected in groundwater at the Site: Bromodichloromethane (detection limit = 0.19 µg/L), ethylbenzene (detection limit = 0.17 µg/L). Other listed constituents were not analyzed for and are not expected to be present at the Site.

This change does not affect protectiveness of the remedy because institutional controls are in place and effective to prevent future exposures to contaminated groundwater.

2020 Trans-1,2-Dichloroethylene Noncancer Toxicity Value
In November 2020, EPA finalized a new RfC for trans-1,2-DCE based on a new PPRTV. There previously was no RfC for trans-1,2-DCE.

During the March 2023 groundwater monitoring event, trans-1,2-DCE was detected at concentrations up to 130 µg/L. The current RSL based on a HQ of 0.1 is 6.8 µg/L. Privately owned water supply wells within a mile of the Site were sampled in 2021. Trans-1,2-DCE was detected in one well at a concentration of 0.3 µg/L, which was below the laboratory reporting limit.

The remedy remains protective because water supply sampling did not detect trans-1,2-DCE at concentrations exceeding the RSL or MCL. There is no exposure to groundwater because institutional controls are in place in the form of deed restrictions on the NHBB property and a town ordinance restricting groundwater use within 1,000 feet of the Site. The protectiveness of the remedy is not affected.

Lead in Soil Cleanups
EPA continues to examine the science around lead exposure. Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 micrograms per deciliter (µg/dL). Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL."

Based on this updated scientific information, EPA is including an evaluation of potential lead risks with a goal to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL BLL. This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology (ALM). These updates are based on the analysis of the National Health and Nutrition Examination Survey 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default Integrated Exposure Uptake Biokinetic Model and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels of 200 ppm and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

Given the ongoing review of information, the above screening levels are considered in this FYR for informational purposes.

During the RI, lead was detected in soil at a maximum concentration of 27 ppm, which is below residential and commercial/industrial screening levels. Therefore, these updates do not impact protectiveness.

Changes in Risk Assessment Methods
There are no changes in risk assessment methods since the 2018 FYR that affect the protectiveness of the remedy.

Changes in Exposure Pathways
There are no changes in land use or site conditions since the previous FYR. The primary site contaminant risks identified in the 1989 ROD were from ingestion of contaminated groundwater by residents and incidental ingestion of contaminated sediments. The 2010 ROD Amendment reaffirmed the potential for unacceptable risks from groundwater contamination at the Site, as well as the potential for vapor intrusion exposures. Institutional controls are in place and effective at preventing future use. Additionally, contaminated sediments have been removed, eliminating the ingestion pathway.

2018 EPA VISL Calculator
In February 2018, EPA launched an online VISL calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas and indoor air. The VISL calculator uses the same database as the RSLs for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. The User's Guide provides further details on how to use the VISL calculator: www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

Vapor Intrusion
In 2019, downgradient vapor intrusion risk was analyzed using soil gas sampling at the Lionheart Classical Academy building, which at that time was in commercial use. Soil gas samples were collected from the three existing exterior soil gas probes and two existing sub-slab soil gas probes on the property. Detections of VOCs in the soil gas samples were all below NHDES waste management vapor intrusion screening levels and EPA VISLs developed for commercial land use.

In March 2023 after being notified that the building was in use as a school, EPA requested several measures to appropriately evaluate vapor intrusion risk at Lionheart Classical Academy because of the change in use. In response, PRP contractors compared existing 2010 and 2019 TCE, PCE and vinyl chloride soil gas data to residential VISLs. These concentrations were below residential VISLs, as shown in Table F-3 in Appendix F. Further discussion is included in the Data Review Section of this FYR Report.

In addition to soil gas, semi-annual groundwater monitoring data is compared to EPA VISLs to evaluate the potential for vapor intrusion at the Lionheart Classical Academy. Annual soil gas sampling is planned until an effective replacement PRB is in place and groundwater concentrations near the Lionheart Classical Academy show a decreasing trend.

Ecological Risk Assessment
2021 Development of the Ecological Screening Values (ESVs) for PFAS
ESVs have been developed to support screening-level ecological risk assessments sites where PFAS have been detected in soils and surface waters. The ESVs, developed for eight PFAS, represent PFAS concentrations in soil and surface water at or below which chronically exposed biota are not expected to be adversely affected and ecological risks or other impacts are unlikely.

The ESVs support the screening-level steps (steps 1 and 2 of eight steps) of EPA's Ecological Risk Assessment Guidance for Superfund and may be applied at sites undergoing investigation for the historic release or disposal of PFAS, to identify whether PFAS levels pose potential unacceptable ecological risks. Sites that have concentrations of PFAS that exceed ESVs may require further investigation in a baseline ecological risk assessment, which in turn may support risk-management decisions and actions to reduce risks. These ESVs are solely for use in conducting screening-level ecological risk assessments and are not recommended or intended for use as default cleanup values.

The ESVs were developed for the following media and receptors:

- Soils for invertebrates.
- Soils for plants.
- Soils for avian and mammalian wildlife.
- Surface water for freshwater and marine aquatic biota.
- Surface water for aquatic-dependent avian and mammalian wildlife.

The ESVs can be found in *Derivation of PFAS Ecological Screening Values* (Grippo et al, 2021).

Given that PFAS concentrations in Site groundwater did not exceed EPA RSLs during the 2023 sampling event, there is no current plan to sample additional environmental media for PFAS.

Expected Progress Toward Meeting RAOs

The 2010 AROD specified the following RAOs:

- Restore the entire aquifer outside of the TI Waiver Area to drinking water quality (MCLs) in as short a time as practicable in order to return the South Municipal Water Supply Well to the town of Peterborough as a drinking water source without the implementation of wellhead treatment.
- Prevent the migration of contamination from within the TI Waiver Area into other portions of the aquifer, the dilute plume area, and overlying structures to the extent practicable.
- Reduce contaminant concentrations within the TI Waiver Area.
- Reduce soil contaminant concentrations outside the TI Waiver Area to NHDES Method 1 Category S-1 soil standards.
- Prevent exposure to the contaminated soil and groundwater both within the TI Waiver Area and outside the TI Waiver Area.

NHBB and their contractors are implementing the remedy as selected by the 2010 AROD. Because the remedy is still being implemented, this FYR does not evaluate the progress toward meeting the RAOs.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

The expected impacts of climate change in New England pose increasing risks to contaminated sites. Increases in air and water temperature, precipitation, flooding and periods of drought may result in altered fate and transport pathways and exposure assumptions, impaired aquatic habitats, dispersal of contaminants, damage to remediation related structures and ultimately, ineffective remedies. At coastal sites, saltwater impacts made more likely by sea-level rise may cause corrosion of remediation equipment and impair restoration efforts. Increased frequency of extreme weather events may cause damage or releases at sites, impairing remedial efforts where remedies have not been adequately designed to protect against these risks.

The risks posed by climate change in New England are not expected to alter the protectiveness of the remedy at the Site. The Site building lies in an upland area that is at low risk of flooding and has a low risk for severe storms. Once installed, the replacement PRB will not have any aboveground features, so it is unlikely to be impacted or damaged by storm events or flooding. Any damage to remedial design features caused by increased storm events because of climate change will be identified and addressed through Site inspections.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues and Recommendations Identified in the FYR:
None.

Issues and Recommendations Identified in the FYR:

OU(s): 1	Issue Category: Remedy Performance			
	Issue: The existing PRB is not effectively treating the plume at any point along the wall regardless of the influent concentrations and gradients. A replacement PRB is necessary.			
	Recommendation: Complete the replacement PRB in 2024, as planned.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/31/2024

OU(s): 1	Issue Category: Remedy Performance			
	Issue: There are potentially additional source areas of DNAPL, VOCs and 1,4-dioxane.			
	Recommendation: Obtain definitive data through groundwater and/or soil sampling to delineate extent, estimate contaminant mass, and determine appropriate remedial technologies for all potential source areas.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/29/2027

OU(s): 1	Issue Category: Remedy Performance			
	Issue: There is considerable uncertainty regarding the horizontal and vertical extent of the PCE, TCE and 1,4-dioxane plumes. PCE concentrations exceeding the MCL outside of the TI Waiver Area are not defined. In the area north and northwest of the ERH treatment area where DNAPL mass is likely to exist, there are no monitoring wells to determine the extent of VOCs in the upgradient direction. Additionally, contaminant transport and extent of contamination in the deep overburden and bedrock aquifer is not well understood.			
	Recommendation: Perform additional characterization, including the potential installation and sampling of additional monitoring wells or soil cores to define the horizontal and vertical extent of the VOC plumes.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/29/2027

OU(s): 1	Issue Category: Remedy Performance
	Issue: The former SDE building is now occupied by Lionheart Classical Academy, a charter school. The Lionheart Classical Academy building is located over the downgradient edge of the VOC plume.

	Recommendation: Continue to monitor the potential for vapor intrusion at the school.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/29/2026

Other Findings

The following additional recommendations were identified during this FYR. They may improve performance of the remedy but do not affect current or future protectiveness:

- When evaluating remedial techniques for affected source areas, consider their effectiveness in treating 1,4-dioxane.
- Complete preparations for in-situ bioremediation and implement the remedy component.
- Reductive dechlorination is apparent in the ERH treatment area and downgradient. However, reducing bacteria are unlikely to be active post-ERH. Additional studies should be undertaken to determine what is controlling the observed reductive dechlorination in an effort to assess possible amendments to enhance the reduction.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy is protective of human health and the environment in the short-term because: the Town of Peterborough's aquifer protection zoning overlay district was reestablished in 2009; the Site and adjacent areas are served by a municipal water supply system which prevents any current direct exposures to contaminated groundwater present at the Site; and vapor intrusion evaluations do not indicate an unacceptable human health risk provided the existing engineering controls are maintained. However, for the remedy to be protective in the long-term, it must demonstrate that the selected remedy is preventing the migration of contamination beyond the TI Waiver Area. Specifically, it must demonstrate that: the replacement PRB wall is effective; vapor intrusion at the Lionheart Classical Academy building and the Strang residence is not a concern; contaminant levels in bedrock at the TI Waiver Area boundary are below the groundwater cleanup goals; additional source areas upgradient of the thermal treatment zone are adequately addressed; and the source area in the thermal treatment zone can be adequately addressed by bioremediation. In addition, it must be demonstrated that the aquifer outside the TI Waiver Area has been restored to drinking water quality and vapor intrusion does not present an unacceptable human health risk in the absence of engineering controls.

VIII. NEXT REVIEW

The next FYR for the South Municipal Water Supply Well Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

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APPENDIX B – SITE CHRONOLOGY

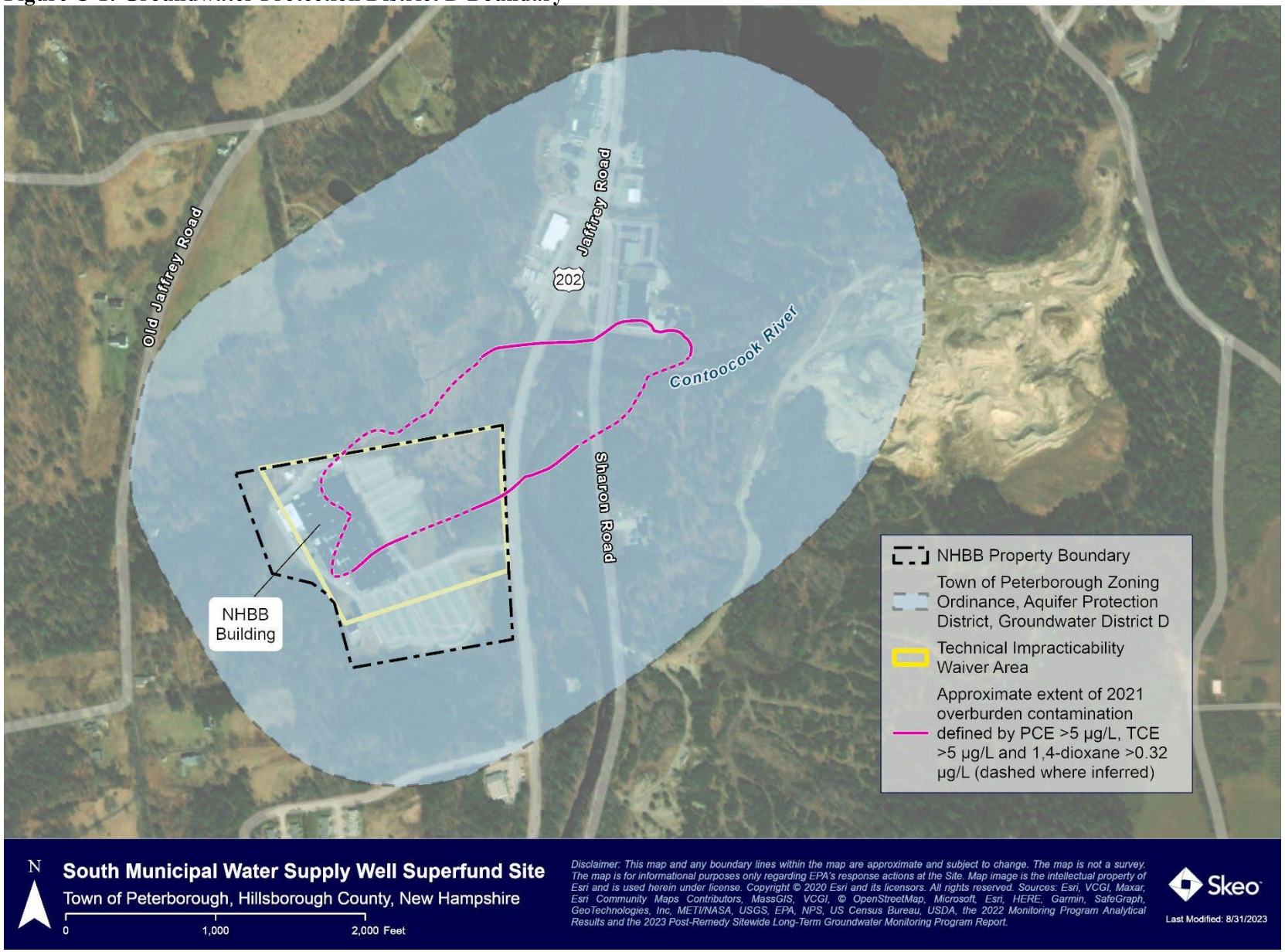
Table B-1: Site Chronology

Event	Date
Contamination discovered in the municipal water well	October 1982
South Well taken offline	December 1982
Site's listing on the NPL finalized	September 21, 1984
Site's RI and feasibility study completed	September 27, 1989
EPA issued the Site's ROD	September 27, 1989
Effective date of Unilateral Order to NHBB to implement remedy	July 9, 1990
EPA issued first ESD addressing air emission controls and sediment excavation	May 6, 1993
NHBB started construction	June 7, 1993
Start of groundwater treatment plant operation	March 12, 1994
Start of vacuum extraction system	October 1994
NHBB completed construction of sediment removal and wetlands restoration	November 1994
EPA issued the second ESD addressing technical impracticability waiver resulting in the termination of operation for several extraction wells and the soil vapor extraction	February 3, 1997
EPA issued the Site's first FYR Report	June 2, 1998
Extraction well EX-7 in dilute plume taken offline	November 17, 1998
Extraction well EX-10 began operating	May 16, 2002
EPA issued the Site's second FYR Report	June 2, 2003
NHBB performed the South Well pumping test	October 6, 2003, through February 3, 2005
NHBB performed Source area delineation	December 15, 2006, through February 6, 2007
Additional source area delineation	April 2008
EPA issued the Site's third FYR Report	August 2008
NHBB submitted the FFS for source mass reduction and plume management to agencies	September 2009
NHBB conducted indoor air sampling (NHBB facility and SDE commercial building)	October 2009
EPA issued the Site's AROD	September 30, 2010
NHBB completed Phase II indoor air sampling (residence and SDE commercial building)	November 2010
NHBB submitted the Phase II indoor air evaluation, Revision 2	February 2012
Agency requested sonic soil borings	July 2012
Effective date of First Modification to Administrative Order/Scope of Work to NHBB and Minebea Co., Ltd.	September 28, 2012
NHBB submitted the PRB PDI	July 2011 through December 2013
NHBB facility indoor air and sub-slab soil gas sampling	January 2013
Source area PDI	August 2012 through May 2013
Source Area PRB PDI Report, draft submittal	July 2013
NHBB submitted the vapor intrusion reevaluation and baseline human health risk assessment of the NHBB facility	September 2013
NHBB began operating the SVE system	March 2014
NHBB completed PRB wall installation	July 2014
NHBB completed in-situ thermal treatment	November 2016
Fourth FYR Report could not determine protectiveness due to uncertainty about vapor intrusion risks in the NHBB building	September 30, 2018
Addendum to the Site's fourth FYR determined that the vapor intrusion pathway did not pose unacceptable risk	August 9, 2017
EPA issued the Site's fifth FYR Report	September 20, 2018
NHBB conducted initial PFAS sampling	December 2018

Event	Date
NHBB submitted FFS Work Plan for Highbay Area of Concern	September 2019
NHBB completed privately owned bedrock well sampling	March 2022
Lionheart Classical Academy began operating in the former SDE building	September 2022
NHBB performed additional PFAS sampling	March 2023
EPA approved Remedial Design for Replacement PRB	March 2023

APPENDIX C - GROUNDWATER PROTECTION DISTRICT D

Figure C-1: Groundwater Protection District D Boundary



EPA to Review Cleanups at Six New Hampshire Superfund Sites this Year

January 18, 2023

Contact Information
Jo Anne Kittrell (kittrell.joanne@epa.gov)
(617) 918-1822

BOSTON (Jan. 18, 2023) – The U.S. Environmental Protection Agency (EPA) will conduct comprehensive reviews of completed cleanup work at six National Priority List (NPL) Superfund sites in New Hampshire this year.

The sites will undergo a legally required Five-Year Review to ensure that previous remediation efforts at the sites continue to protect public health and the environment.

"Throughout the process of designing and constructing a cleanup at a hazardous waste site, EPA's primary goal is to make sure the remedy will be protective of public health and the environment, especially for communities that have been overburdened by pollution," **said EPA New England Regional Administrator David W. Cash**. "It is important for EPA to regularly check on these sites to ensure the remedy is working properly and New Hampshire communities continue to be protected."

The Superfund Sites where EPA will conduct Five-Year Reviews in 2023 are listed below with web links that provide detailed information on site status as well as past assessment and cleanup activity. Once the Five-Year Review is complete, its findings will be posted to the website in a final report.

Five-Year Reviews of Superfund sites in New Hampshire to be completed in 2023:

Fletcher's Paint Works and Storage, Milford

Kearsarge Metallurgical Corp., Conway

Keefe Environmental Services, Epping

Mottolo Pig Farm, Raymond

South Municipal Water Supply Well, Peterborough

Tibbetts Road, Barrington

More information:
The Superfund program, a federal program established by Congress in 1980, investigates and cleans up the most complex, uncontrolled, or abandoned hazardous waste sites in the country and EPA endeavors to facilitate activities to return them to productive use. In total, there are 123 Superfund sites across New England.

Superfund and other cleanup sites in New England <https://epa.gov/superfund/search-superfund-sites-where-you-live>

EPA's Superfund program <https://epa.gov/superfund>

APPENDIX E – INTERVIEW FORMS

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: South Municipal Water Supply Well Superfund Site	
EPA ID: NHD980671069	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: Stephanie Monette	**Subject affiliation:** NHDES project manager
Subject contact information: stephanie.j.monette@des.nh.gov | (603) 271-6778	
Interview date: Sent 3/28/23	**Interview time:** Sent 3/28/23
Interview location: Online	
Interview format (circle one): In Person Phone Mail **Email** Other:	
Interview category: State Agency	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   The Site is moving along at an appropriate speed to implement the ROD and AROD remedial designs and remedial actions for various components of the site. The recent EPA approval of the 100% PRB design is a significant step towards remedial compliance at the Site.

2. What is your assessment of the current performance of the remedy in place at the Site?

   Installation of the PRB remedial action is anticipated during the 2023 construction season. Future monitoring of the replacement PRB will provide assessment of the remedy performance of the PRB technology for the site groundwater control. Additional studies are still needed to demonstrate that the full-scale application of in-situ enhanced bioremediation is feasible at the Site. At this time, aquifer parameters have returned to ambient conditions post thermal treatment, and the more studies should be conducted. Additional investigations including soil and groundwater in the 1ERH area, bedrock DNAPL and emerging contaminants in the dilute plume that are not captured by the PRB may be advisable.

3. Are you aware of any complaints or inquiries regarding environmental issues at the Site or abutting properties in the past five years?

   No complaints or inquiries were received by the state during this reporting period.

4. If complaints have been received, describe how the state has responded and what actions were taken to resolve the issue. Please provide the status of any complaints and be as detailed as possible.

   No complaints were received by the state during this reporting period.

5. List any outstanding environmental issues that are of concern at the Site that are not already addressed by the remedy or have developed since the implementation of the remedy.

   No other issues other than those identified in the response to question 2 above.

6. Are you aware of any changes to state laws, regulations or policies that might affect the protectiveness of the Site's remedy?

   Yes. Emerging contaminants have been detected in groundwater on site. An initial 2018 round of PFAS sampling was conducted and included two PFAS compounds, PFOA and PFOS, with detections below then-

existing NHDES AGQS. In July 2020, New Hampshire promulgated state MCLs for the following four PFAS into the state's Safe Drinking Water Act:

- PFOA: 12 ng/L (ppt)
- PFOS: 15 ng/L (ppt)
- PFHxS: 18 ng/L (ppt)
- PFNA: 11 ng/L (ppt)

Current state law requires that AGQS be the same value as any MCL established by NHDES and that they be at least as conservative as health advisories set by EPA. Two NHDES regulated PFAS compounds, PFHxS and PFNA, have not been sampled for on site. Additionally, the PFOA and PFOS sampling results from 2018 included detections above recently proposed PFOA and PFOS EPA MCLs. An additional round of PFAS sampling on site was requested by the agencies during spring 2023, to include the four NHDES-regulated PFAS compounds and the six PFAS compounds with EPA screening levels.

Additionally, 1,4-dioxane has been detected in the dilute groundwater plume above the NHDES AGQS. The PRB to be installed in 2023 will not remove 1,4-dioxane from groundwater.

These changes are not expected to impact the short-term protectiveness of the remedy because there is no known exposure to contaminated groundwater and institutional controls are in place to prevent such exposure. However, long-term protectiveness could be called into question when considering these revised standards, due to the potentially unabated migration of, and the potential for, this plume to move toward the Contoocook River.

7. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   The state currently does not have any concerns with institutional controls at the Site.

8. Are you aware of any changes in projected land use(s) at the Site and/or abutters?

   Recently the agencies were notified by the PRP's consultant of a change of use for the SDE building. The SDE changed from a commercial warehouse to a charter elementary school. Additional vapor intrusion exposure evaluation with school exposure scenarios has been requested.

9. Are you aware of the installation of groundwater wells, injection wells, surface discharges or large-scale excavation activities in the vicinity of the property that may alter the direction or velocity of groundwater flow?

   No.

10. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

    The state appreciates continued monitoring of site related contaminants in off-site plumes and investigative actions when appropriate.

11. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?

    Yes.

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: South Municipal Water Supply Well Superfund Site	
EPA ID: NHD980671069	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: Christopher M Rawnsley	**Subject affiliation:** New Hampshire Ball Bearings
Subject contact information: crawnsley@nhbb.com | (603) 924- 3311	
Interview date: Sent 3/28/23	**Interview time:** Sent 3/28/23
Interview location: Online	
Interview format (circle one): In Person Phone Mail **Email** Other:	
Interview category: PRP	

1. What is your overall impression of the remedial activities at the Site?
   Remedial activities, particularly the early SVE, groundwater pumping and treatment, and wetlands remediation were quite successful in mitigating risk to potential receptors, and in reducing overall contaminant mass. The failure of the 2016 PRB installation prevents the overall remedial action from being a "success".

2. What have been the effects of the Site on the surrounding community, if any?
   The closure of the town of Peterborough's South Municipal Well in 1982 (prior to the Site's listing on the NPL) is the obvious impact. Fortunately, the town has not had a supply deficiency as a consequence of the closure. Other than that, I do not think there has been significant effect on the community.

3. What is your assessment of the current performance of the remedy in place at the Site?
   As stated above, the failure of the 2016 PRB installation has prevented the overall remedy from being successful, as it is not meeting its design goals of preventing migration of groundwater above MCLs off NHBB property. Apart from this, the results of the remedial actions taken at the Site have substantially reduced contaminant mass and, to the best of NHBB's knowledge, effectively prevent risk to potential receptors.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   NHBB is aware of only a very few inquiries over the four-decade history of the Site.

5. Are you aware of any issues or have concerns with activities at nearby properties which may impact the effectiveness of the remedy or pose a risk to on-site activities?
   I am not aware of any issues or concerns.

6. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   I certainly feel well informed, but that is not unexpected as a direct stakeholder.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   None at this time.

8. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?
   Yes.

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: South Municipal Water Supply Well Superfund Site	
EPA ID: NHD980671069	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** EPA
Subject name: Carl Elder, Ph.D., P.E., and Rhiannon Scott, Ph.D., P.E.,	**Subject affiliation:** Geosyntec Consultants
Interview date: Thursday, March 30, 2023	**Interview time:** 9:30 A.M. to 10:00 A.M.
Interview location: Microsoft Teams	
Interview format (circle one): In Person Phone Mail Email **Other:**	
Interview category: Potentially Responsible Party (PRP)	

1. What is your overall impression of the remedial activities at the Site?
   Everything is going fine. The previous PRB didn't achieve what was intended originally. We've taken major steps forward considering the bioremediation of the source areas. We now feel like we have a more robust design.

2. What have been the effects of the Site on the surrounding community, if any?
   Not much –there has not been any significant impacts and we are happy with progress at the Site. NHBB is an active PRP.

3. What is your assessment of the current performance of the remedy in place at the Site?
   SVE/SSD in the NHBB facility is working well and mitigating health concerns. They have mitigated risks due to the plume and vapor intrusion. The plume is not expanding, and the well is offline. We feel the initial goals have been met.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   No, we haven't heard any complaints. We did notice increased attention during sampling in late 2021. No major complaints were reported.

   When we did hear about questions, it was because residents were reaching out to the town or the Selectman.

5. Are you aware of any issues or have concerns with activities at nearby properties which may impact the effectiveness of the remedy or pose a risk to on-site activities?
   No.

6. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   Yes.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   No.

8. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?
   Yes.

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: South Municipal Water Supply Well Superfund Site	
EPA ID: NHD980671069	
Interviewer name: Ashlin Brooks	**Interviewer affiliation:** U.S EPA
Subject name: Nicole MacStay and Seth MacLean	**Subject affiliation:** Peterborough's town administrator and assistant town administrator
Interview date: Tuesday, March 21, 2023	**Interview time:** 3:00 P.M.
Interview location: Microsoft Teams	
Interview format (circle one): In Person Phone Mail Email **Other**	
Interview category: Local Government	

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?
   Yes

2. Are there considerations on decommissioning the well?
   The town has no current plans to utilize the South Municipal Well. We purchased an alternate source in partnership with Jaffrey. The South Well won't come back online anytime soon.

3. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   Yes, we feel up to date. We have been very good at communicating. We are comfortable receiving information via email.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?
   No.

5. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?
   No.

6. Are you aware of any complaints regarding environmental issues at the Site or abutting properties in the past five years?
   There are always local concerns about Superfund. The Site drew attention when NHBB did well sampling in a 1-mile radius of the Site.

7. If complaints have been received, describe how the town has responded and what actions were taken to address or forward the complaints.
   The Selectman in neighborhood can reply to complaints and explain the contamination issue and how the process works.

8. Does the town have any immediate plans to turn on the South Municipal Well?
   Seth can provide more information.

9. What is the status of the alternative water source planned with the town of Jaffrey?

That will happen very soon – a joint municipal well site that can handle a redundant water supply aquifer. This helps with development.

10. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

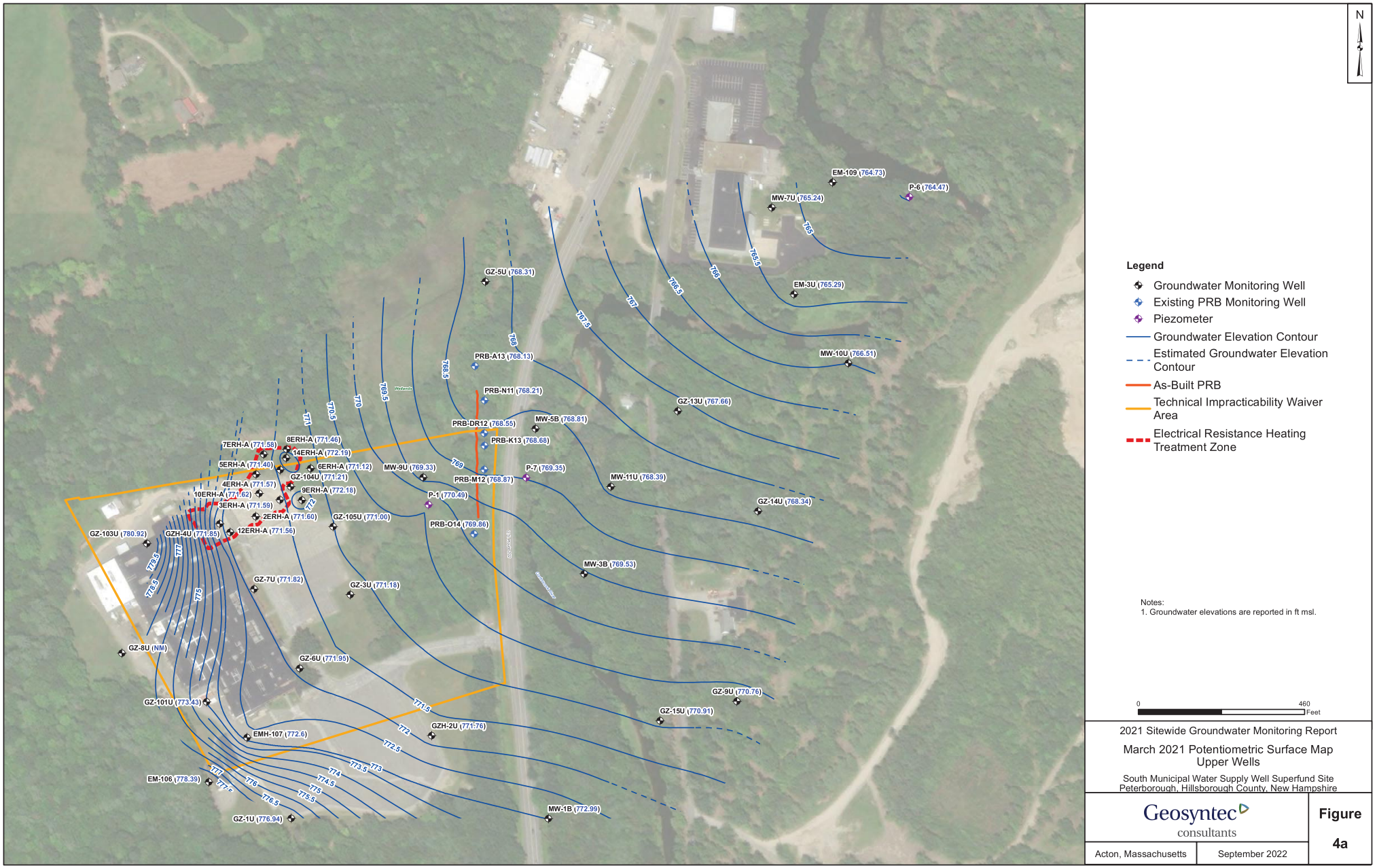
    Yes – they have good communication channels, fact sheets, Facebook posts, neighborhood associations, newsletters, an active private Facebook group that people can join where information is shared.

11. Do you have any comments, suggestions or recommendations regarding the project?
    No.

12. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?
    Yes.

APPENDIX F – SUPPLEMENTAL DATA FIGURES AND TABLES

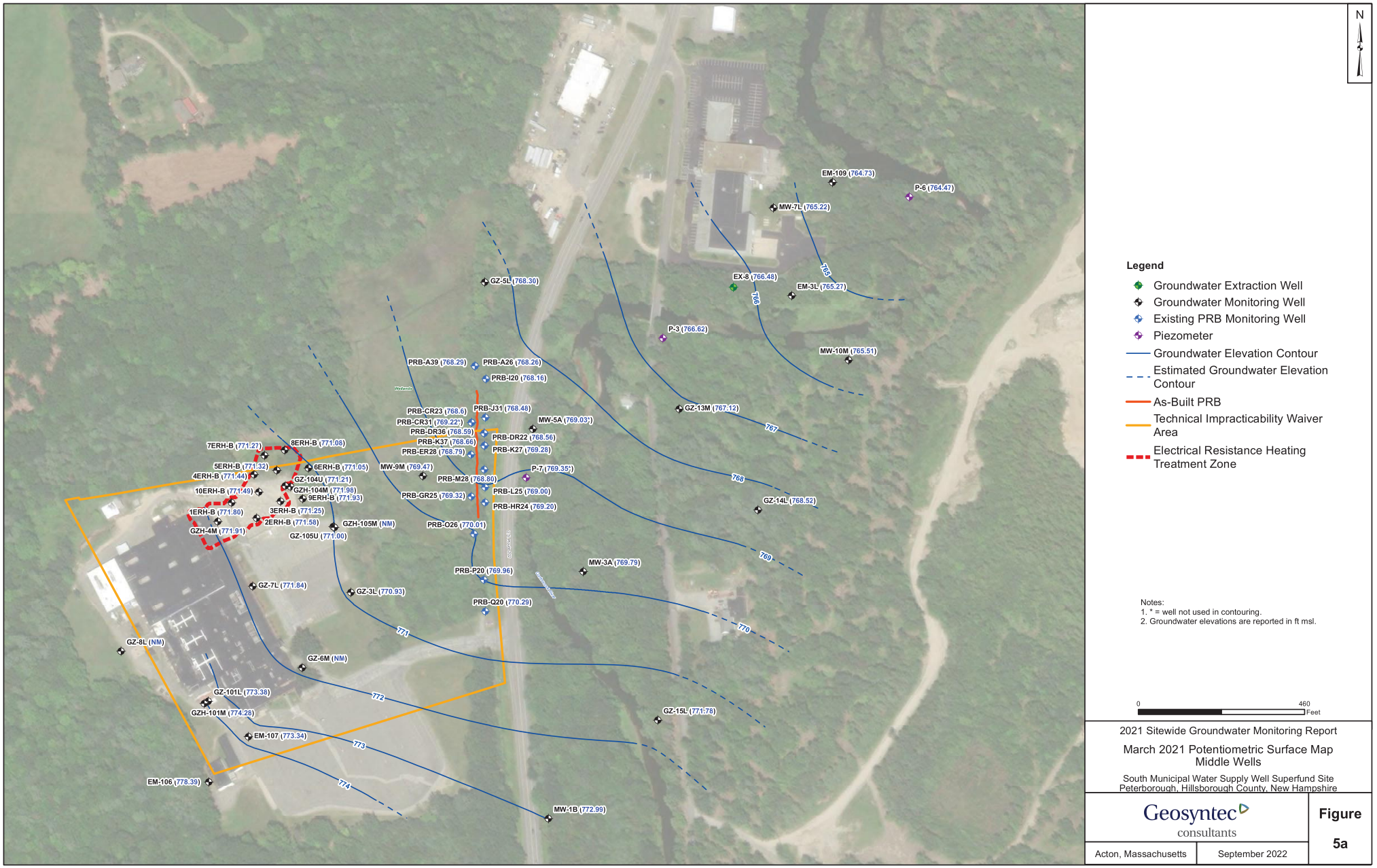
Figure F-1: Potentiometric Surface Map Upper Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Fig4a_GWE_UpperAquifer_March2021.mxd 9/22/2022 12:55:09 PM

Source: Figure 4a from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

Figure F-2: Potentiometric Surface Map Middle Wells, March 2021



2021 Sitewide Groundwater Monitoring Report

March 2021 Potentiometric Surface Map
Middle Wells

South Municipal Water Supply Well Superfund Site
Peterborough, Hillsborough County, New Hampshire

Geosyntec consultants

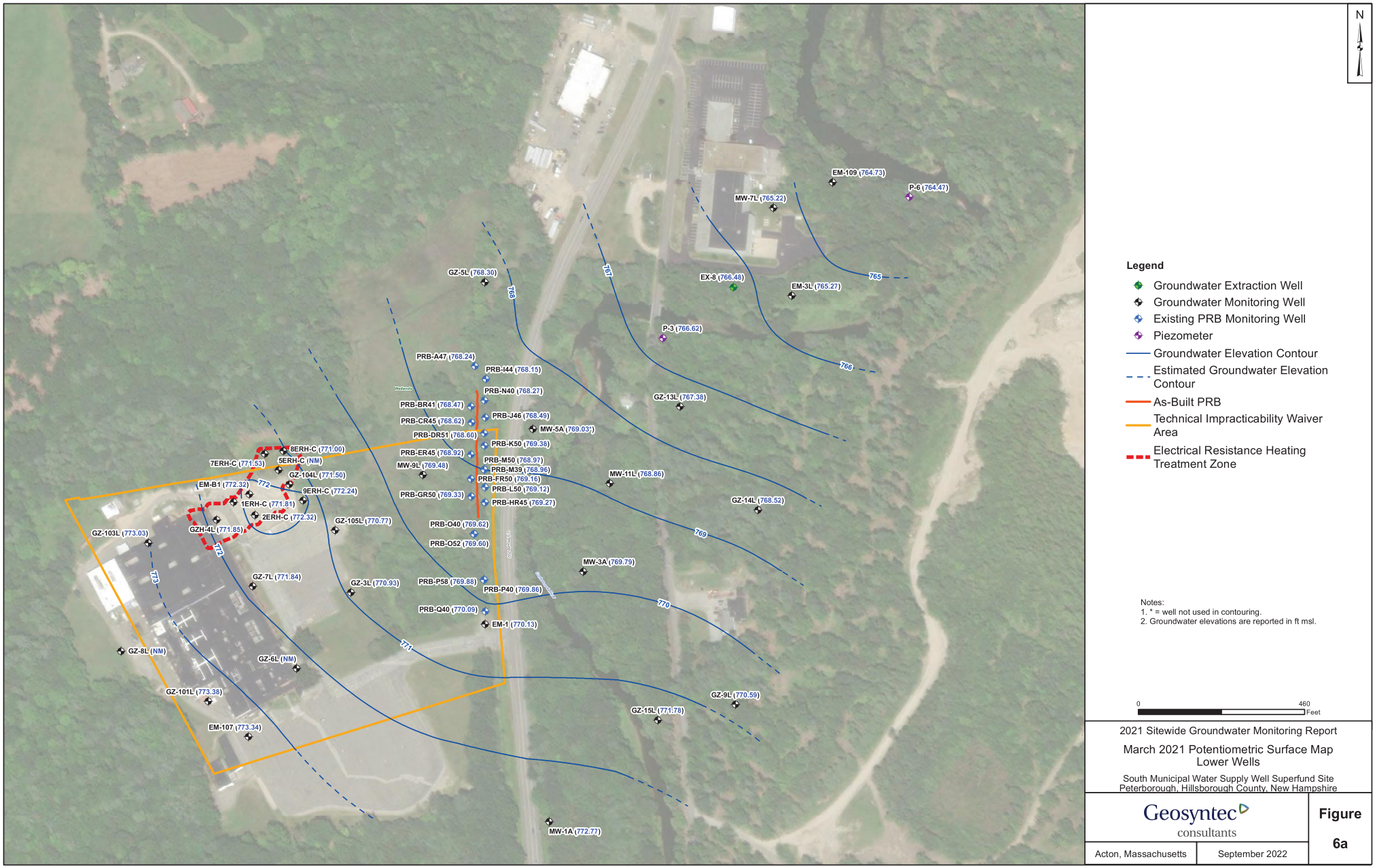
Acton, Massachusetts | September 2022

Figure 5a

Q:\GISProjects\BR0556_NH_BB\MXD\2022\Fig5a_GWE_MiddleAquifer_March2021.mxd 9/22/2022 1:19:02 PM

Source: Figure 5a from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

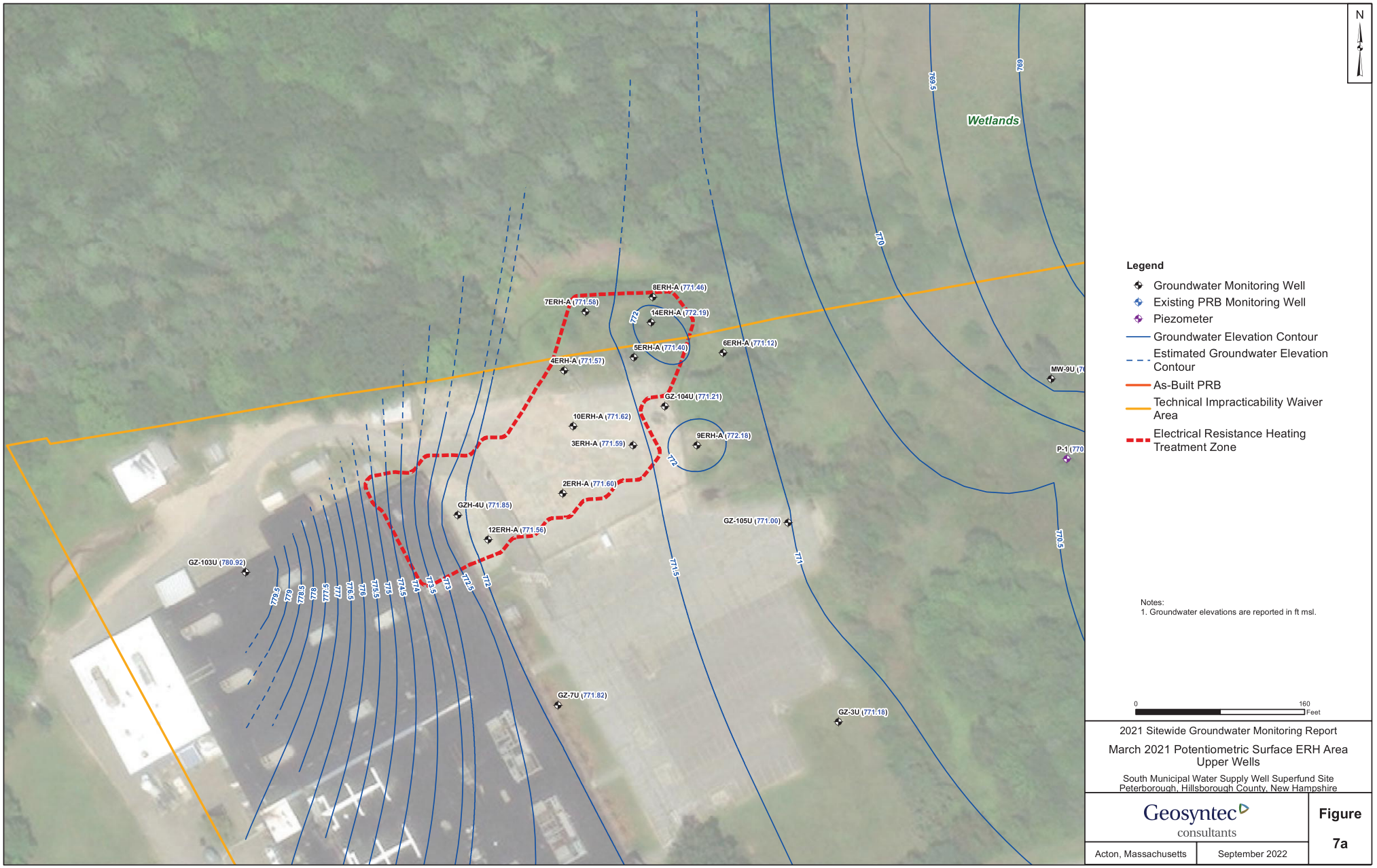
Figure F-3: Potentiometric Surface Map Lower Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Fig6a_GWE_LowerAquifer_March2021.mxd 9/22/2022 1:24:59 PM

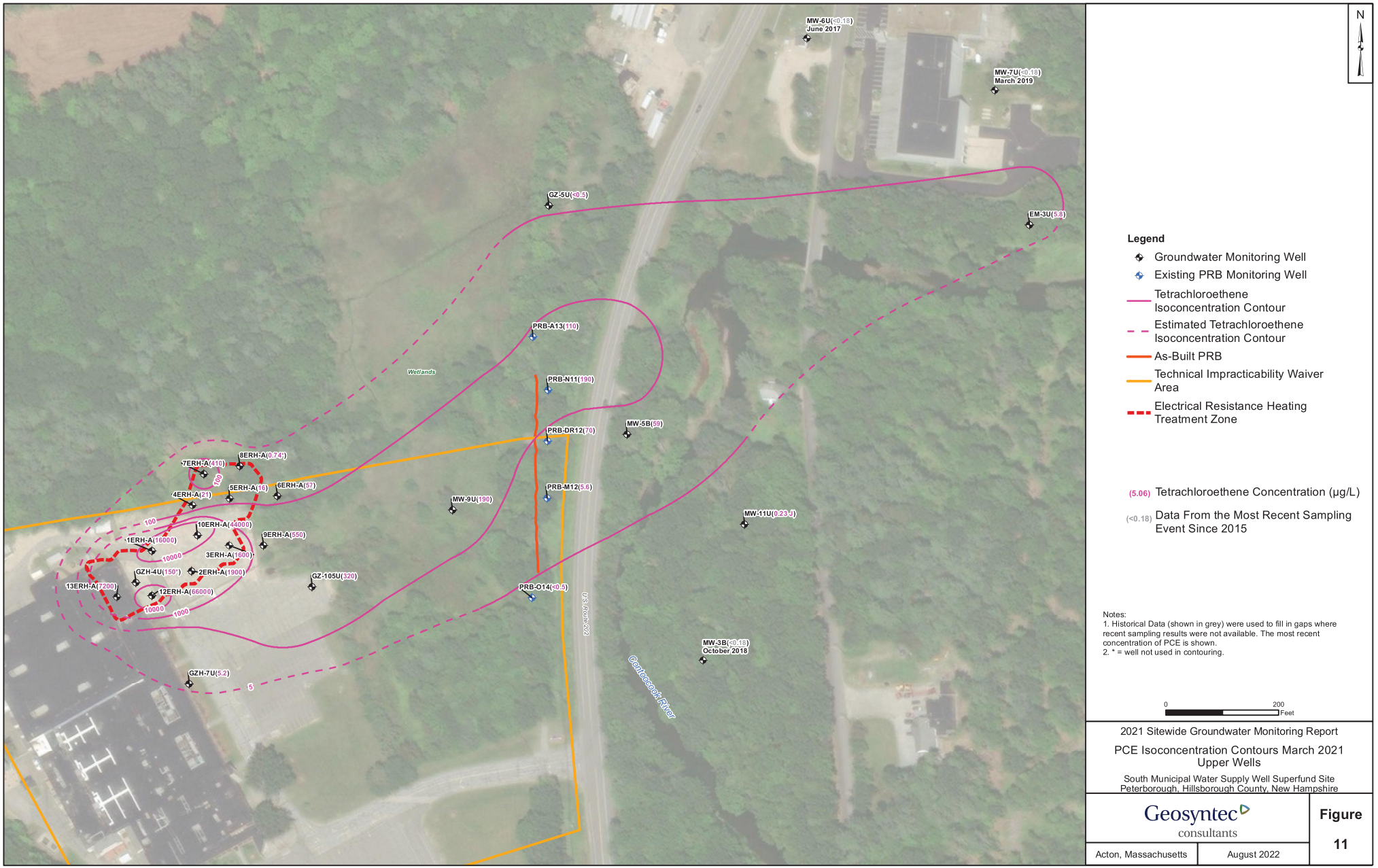
Source: Figure 6a from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

Figure F-4: Potentiometric Surface ERH Area Upper Wells, March 2021



Source: Figure 7a from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

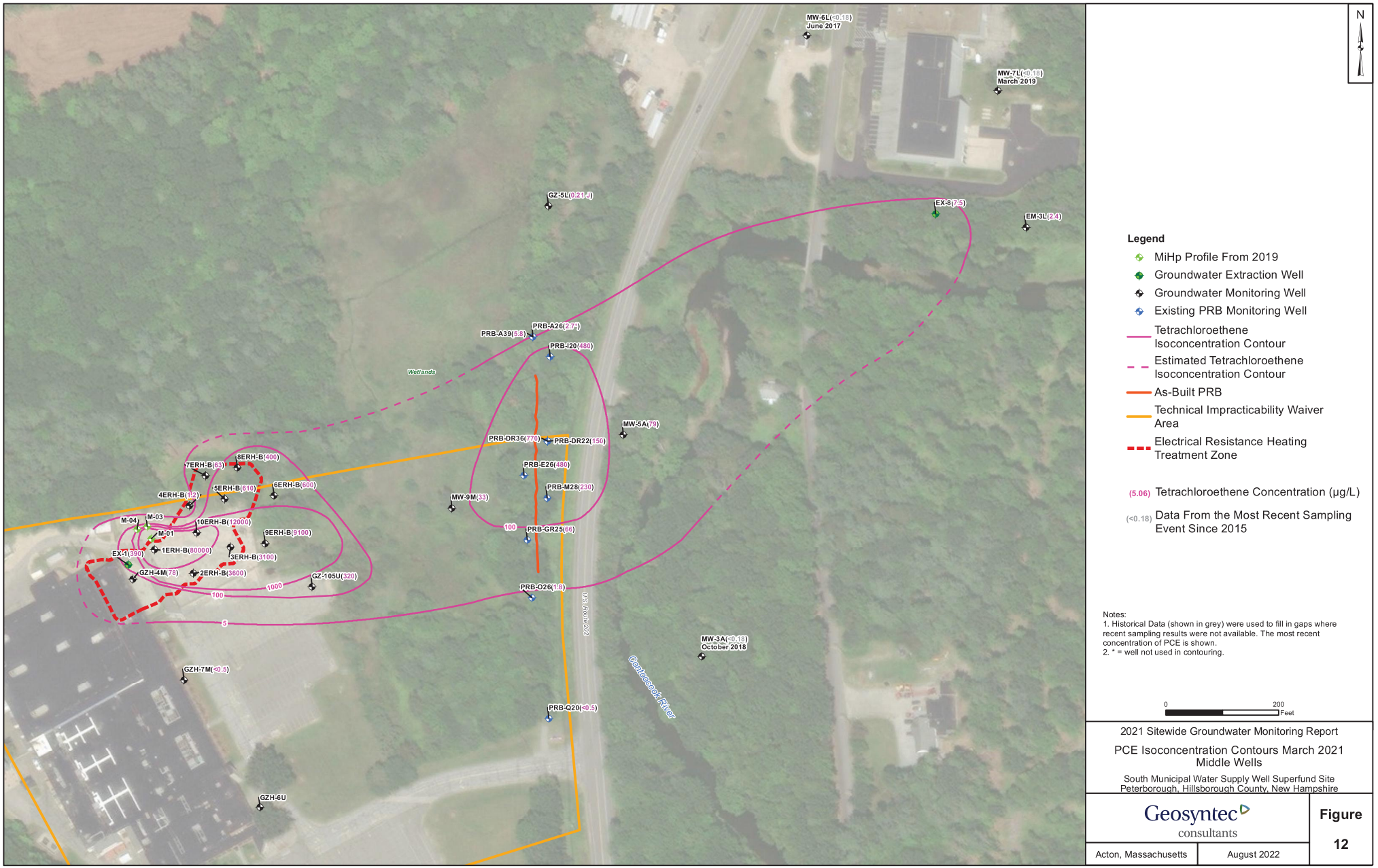
Figure F-5: PCE Isoconcentration Map in Upper Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 11 - PCE Isoconcentration Contours - Upper April 2021.mxd 8/25/2022 11:33:47 AM

Source: Figure 11 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

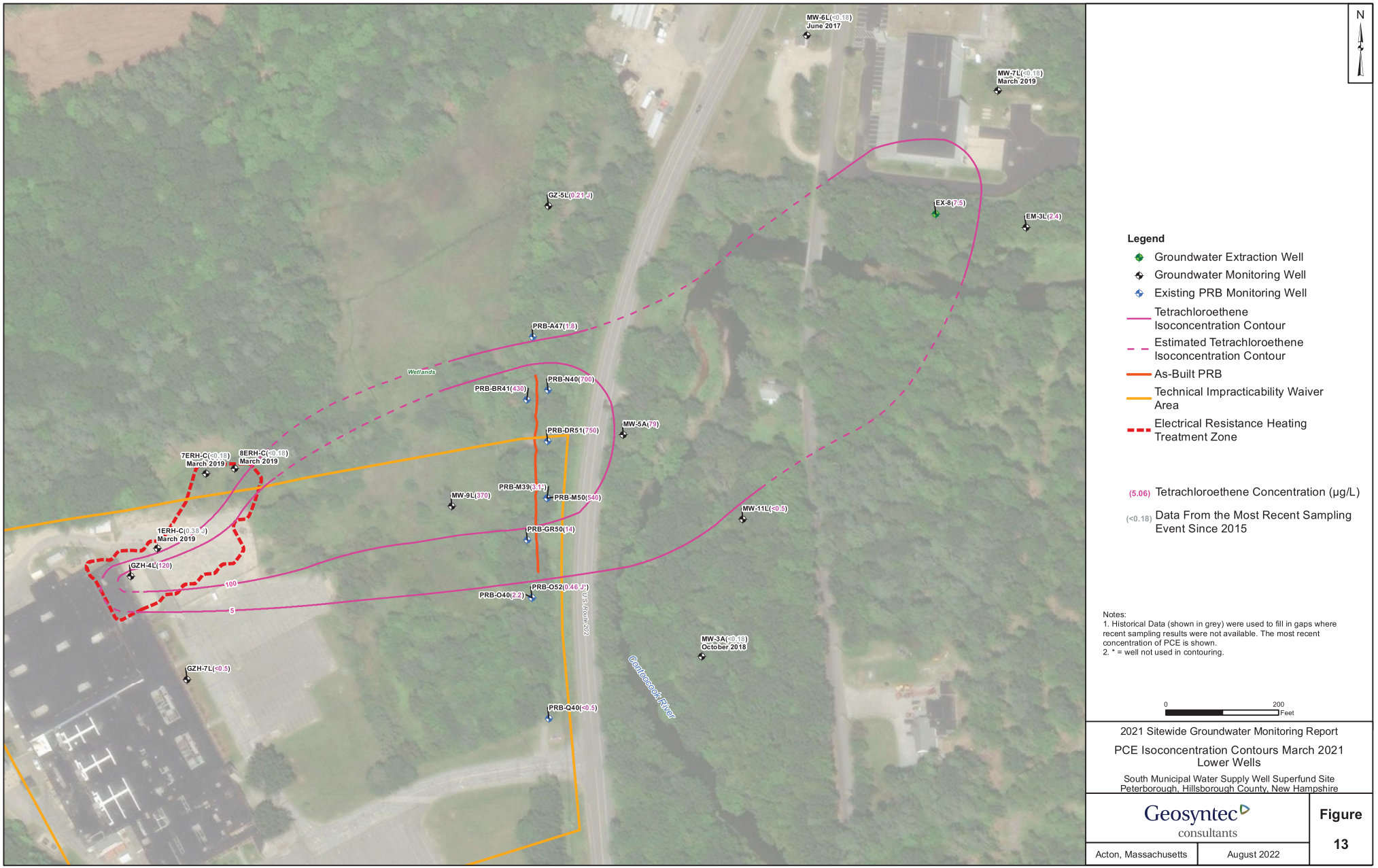
Figure F-6: PCE Isoconcentration Map in Middle Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 12 - PCE Isoconcentration Contours - Middle April 2021.mxd 8/25/2022 11:32:48 AM

Source: Figure 12 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

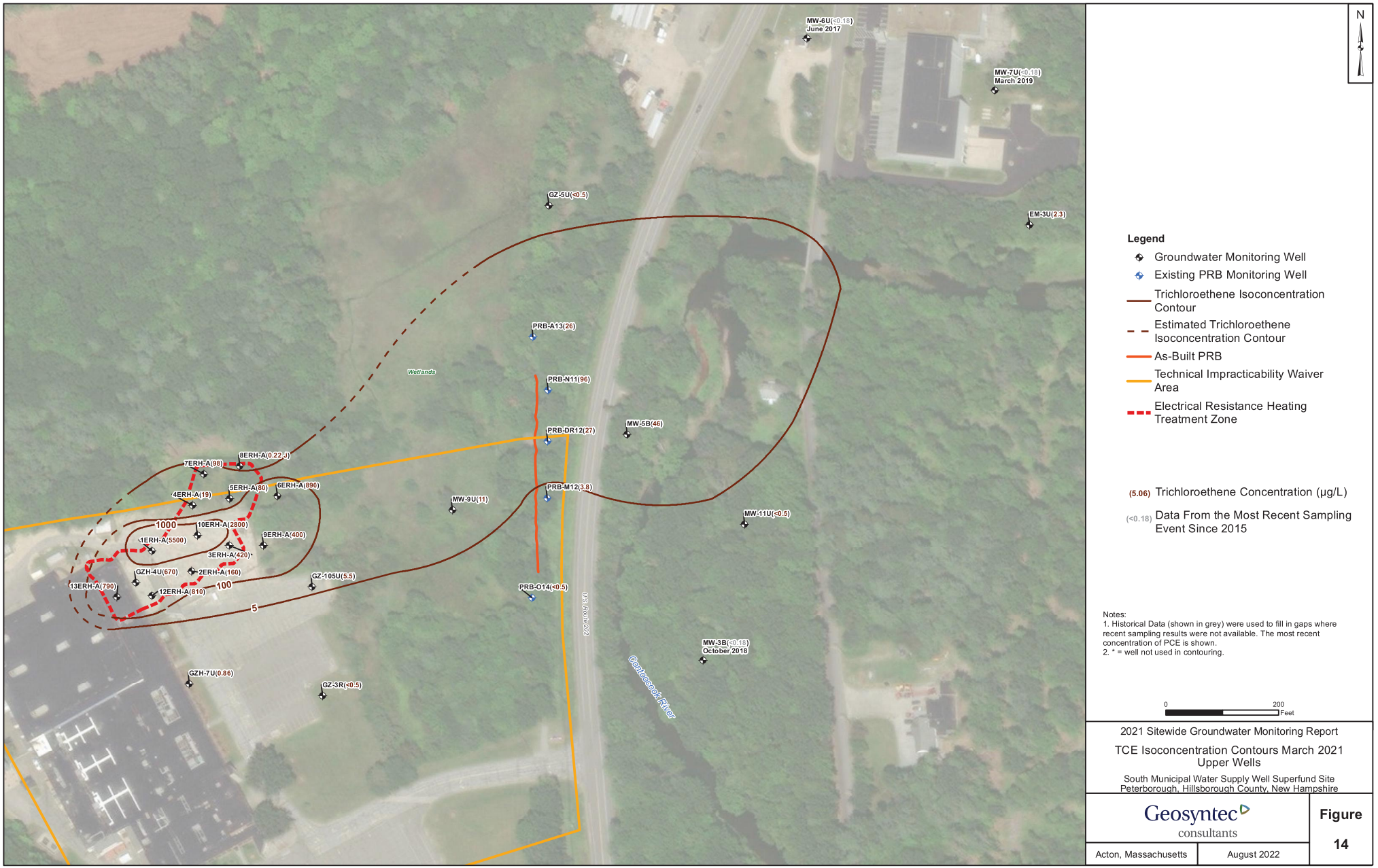
Figure F-7: PCE Isoconcentration Map in Lower Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 13 - PCE Isoconcentration Contours - Lower April 2021.mxd 8/25/2022 11:32:22 AM

Source: Figure 13 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

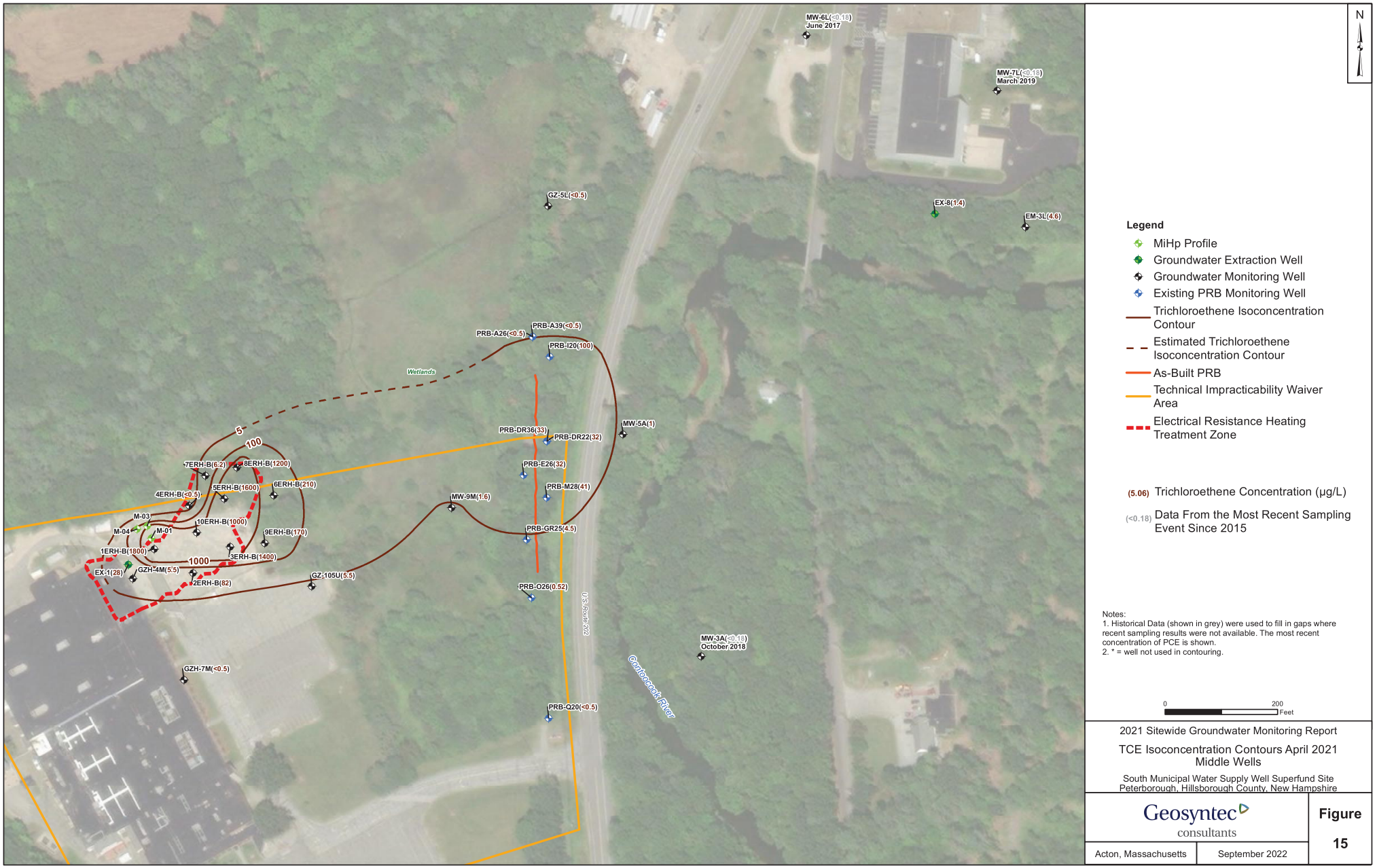
Figure F-8: TCE Isoconcentration Map in Upper Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 14 - TCE Isoconcentration Contours - Upper April 2021.mxd 8/25/2022 11:31:54 AM

Source: Figure 14 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

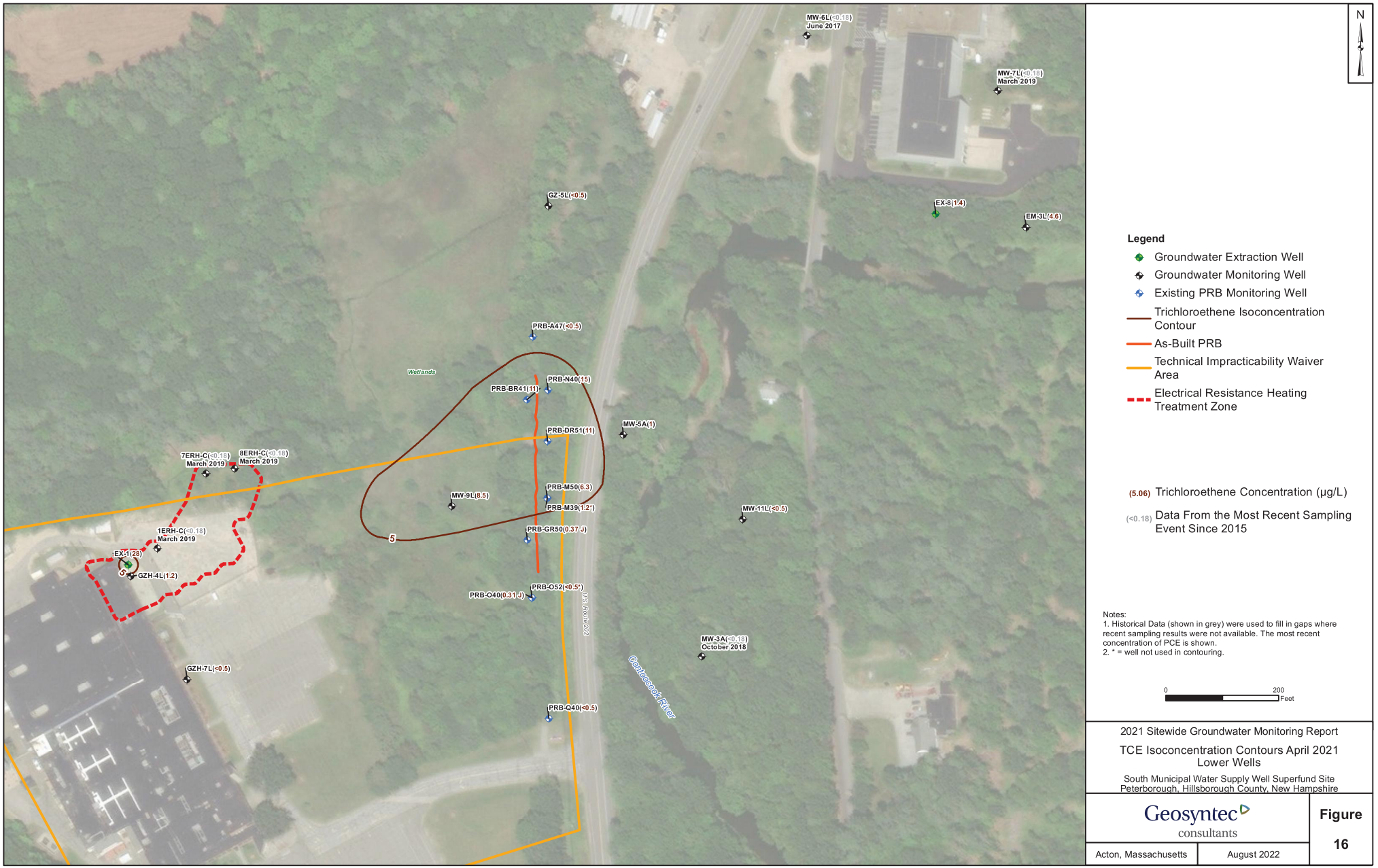
Figure F-9: TCE Isoconcentration Map in Middle Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 15 - TCE Isoconcentration Contours - Middle April 2021.mxd 9/22/2022 2:18:46 PM

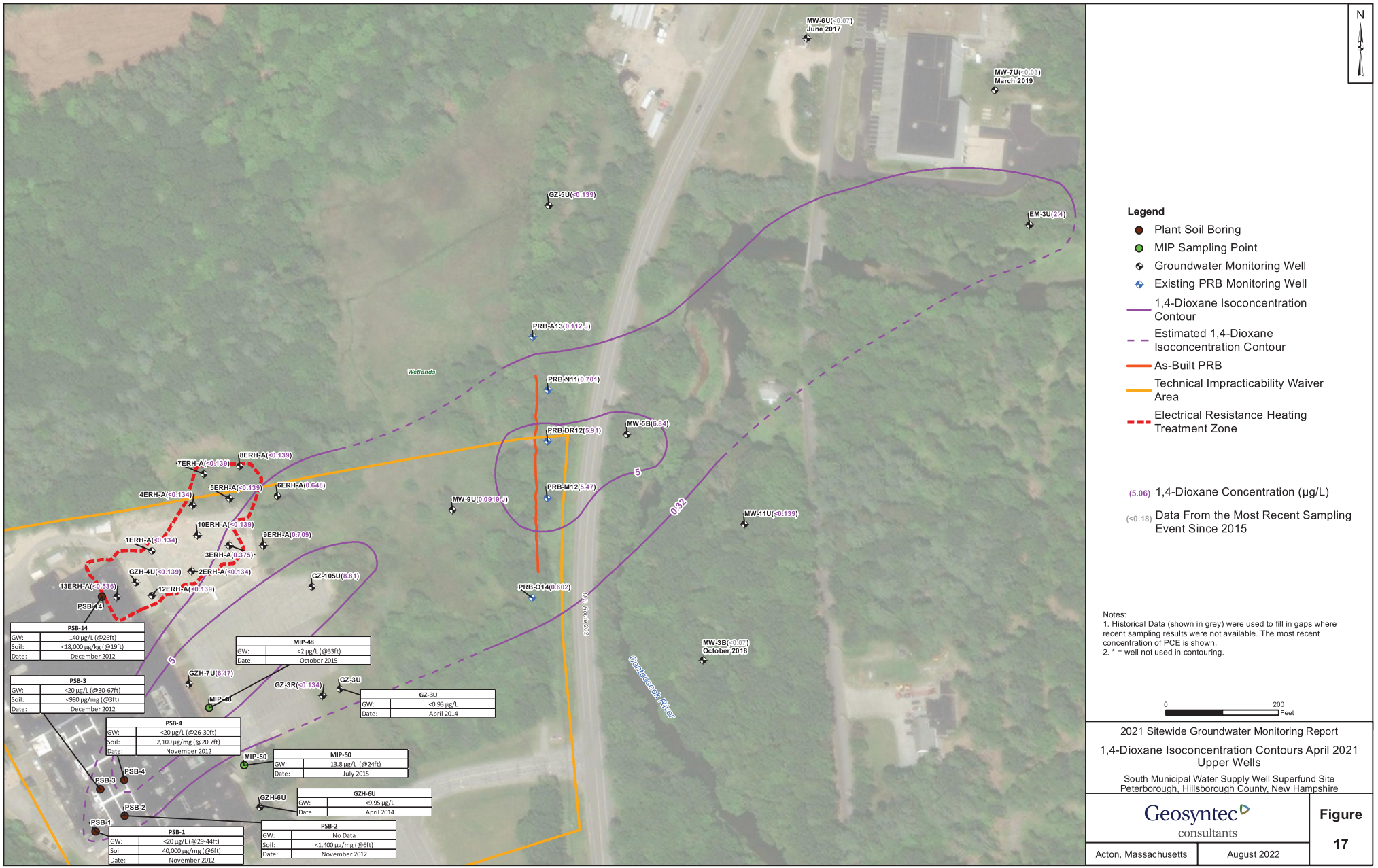
Source: Figure 15 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

Figure F-10: TCE Isoconcentration Map in Lower Wells, March 2021



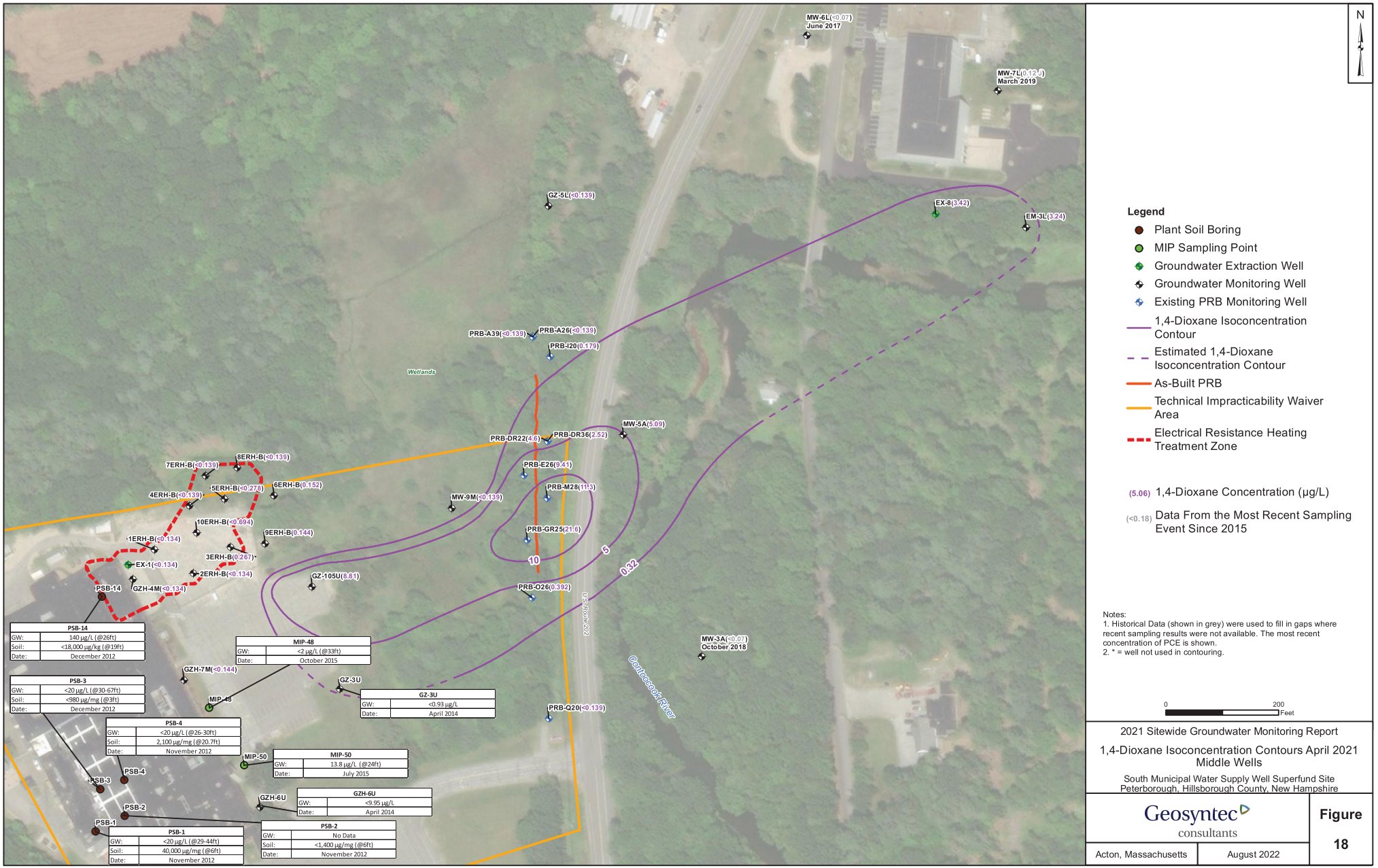
Source: Figure 16 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

Figure F-11: 1,4-Dioxane Isoconcentration Map in Upper Wells, March 2021



Source: Figure 17 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

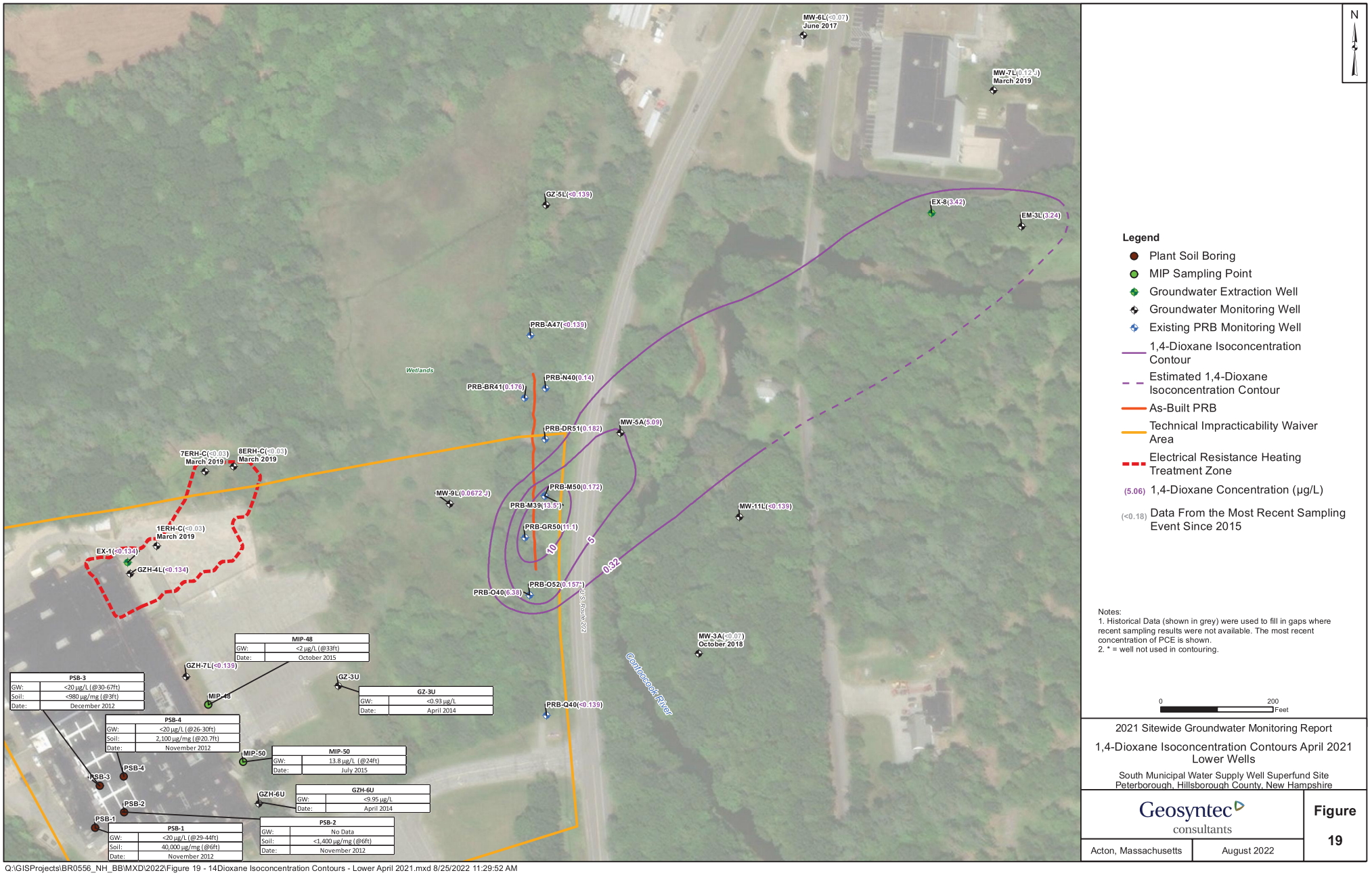
Figure F-12: 1,4-Dioxane Isoconcentration Map in Middle Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 18 - 14Dioxane Isoconcentration Contours - Middle April 2021.mxd 8/25/2022 11:30:00 AM

Source: Figure 18 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

Figure F-13: 1,4-Dioxane Isoconcentration Map in Lower Wells, March 2021



Q:\GISProjects\BR0556_NH_BB\MXD\2022\Figure 19 - 14Dioxane Isoconcentration Contours - Lower April 2021.mxd 8/25/2022 11:29:52 AM

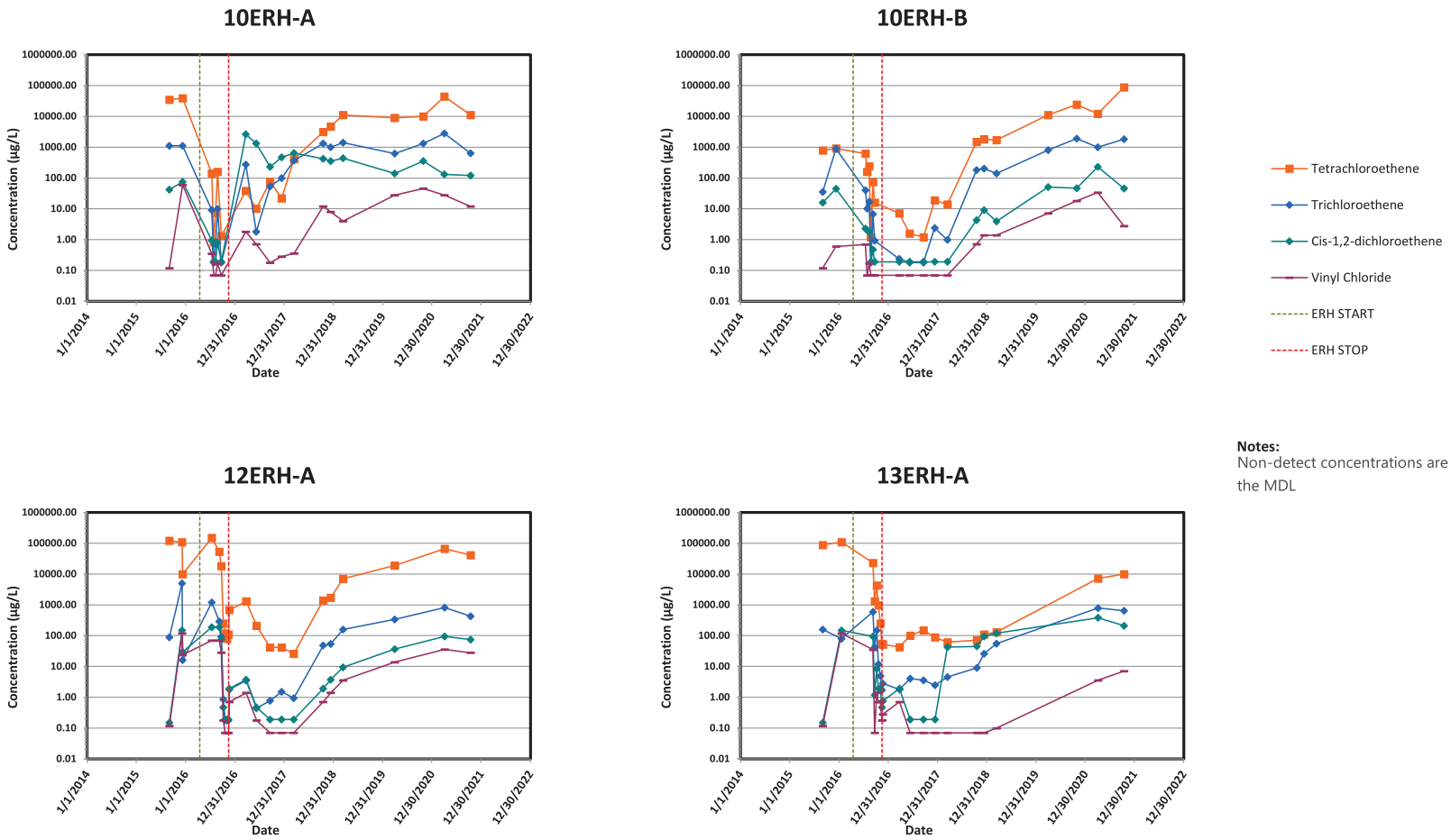
Source: Figure 19 from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report (March 2021)

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20A

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
ERH AREA



Notes:
Non-detect concentrations are shown at the MDL

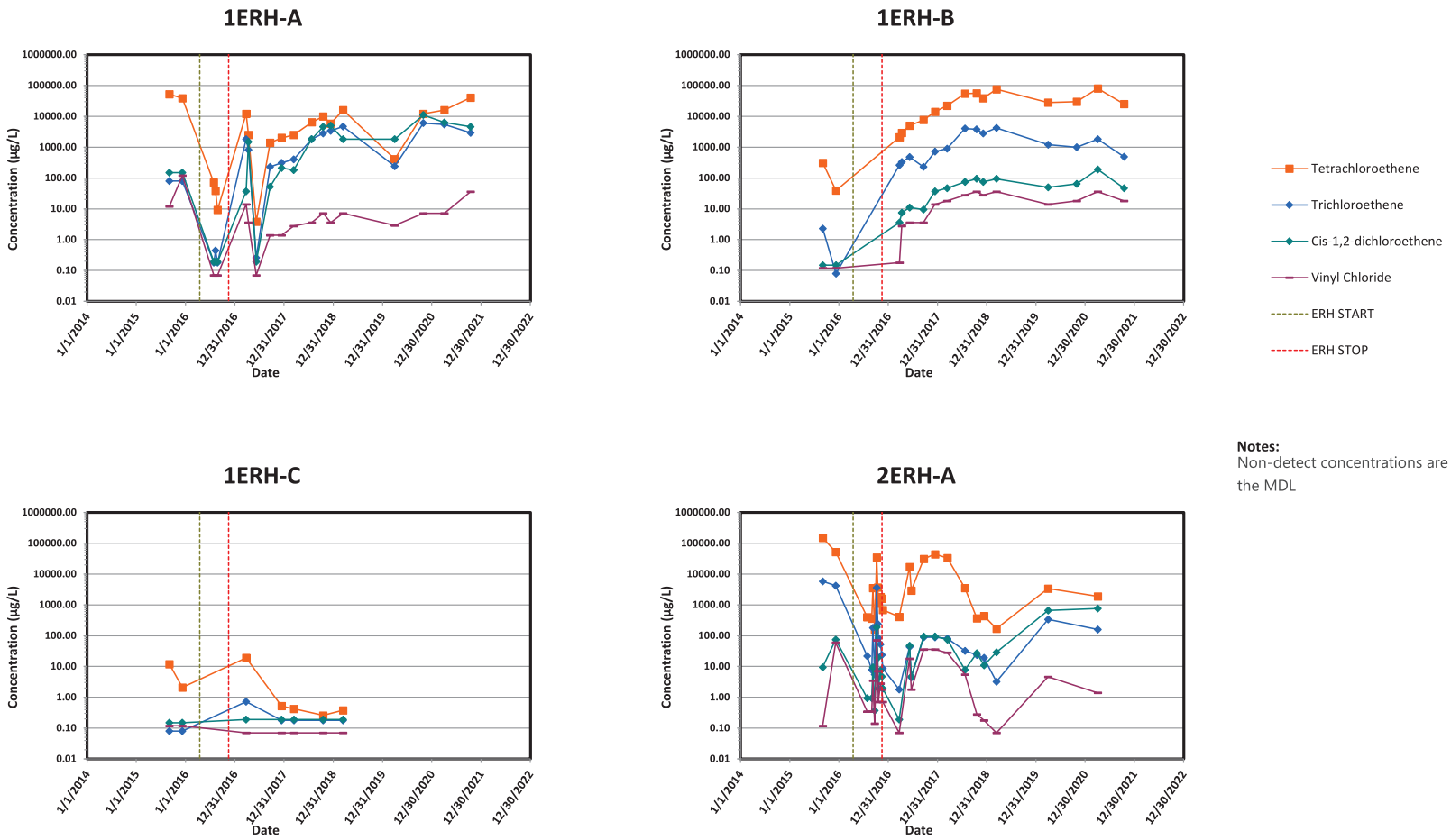
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20A

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
ERH AREA



Notes:
Non-detect concentrations are shown at the MDL

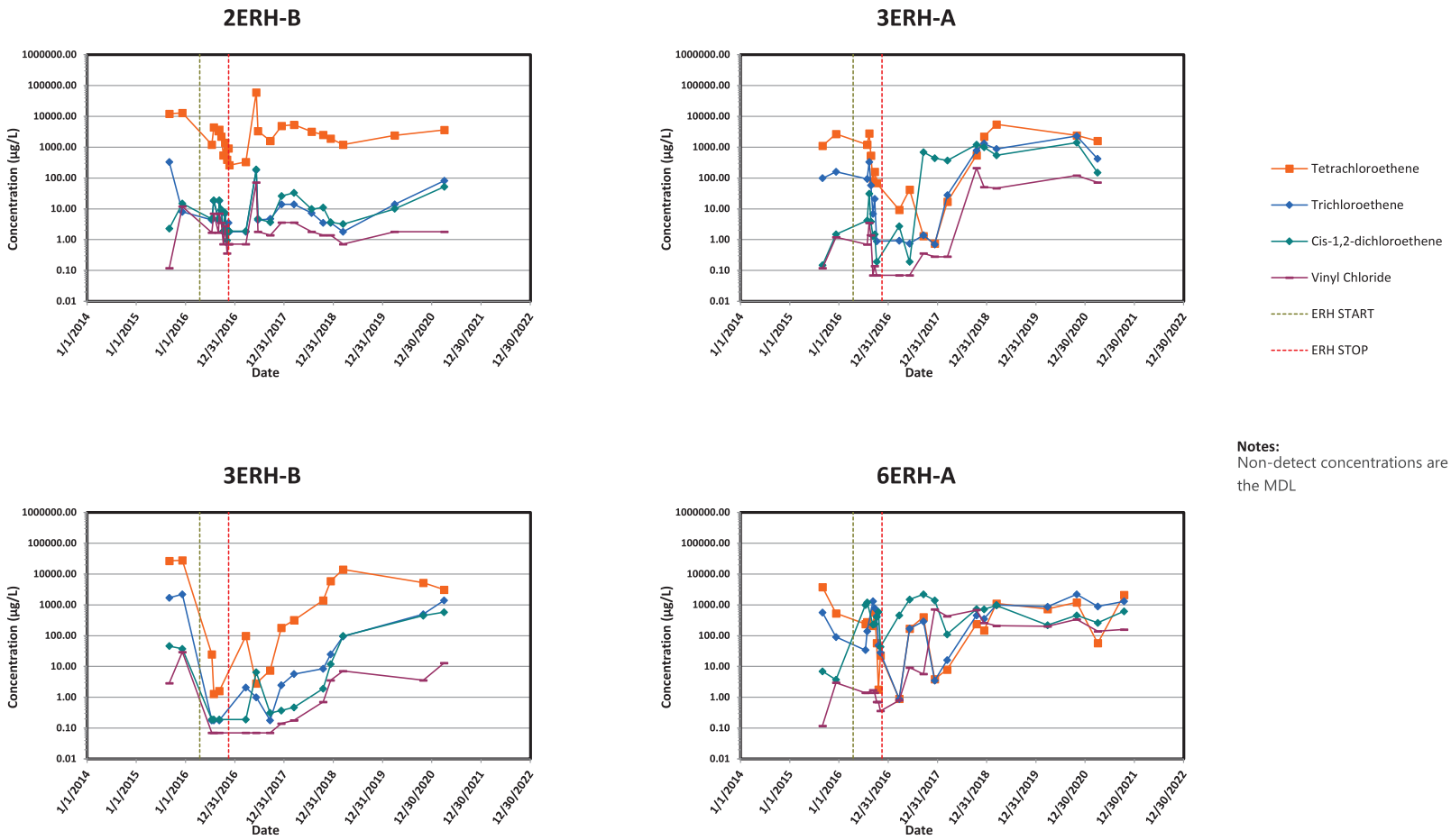
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20A

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
ERH AREA



Notes:
Non-detect concentrations are shown at the MDL

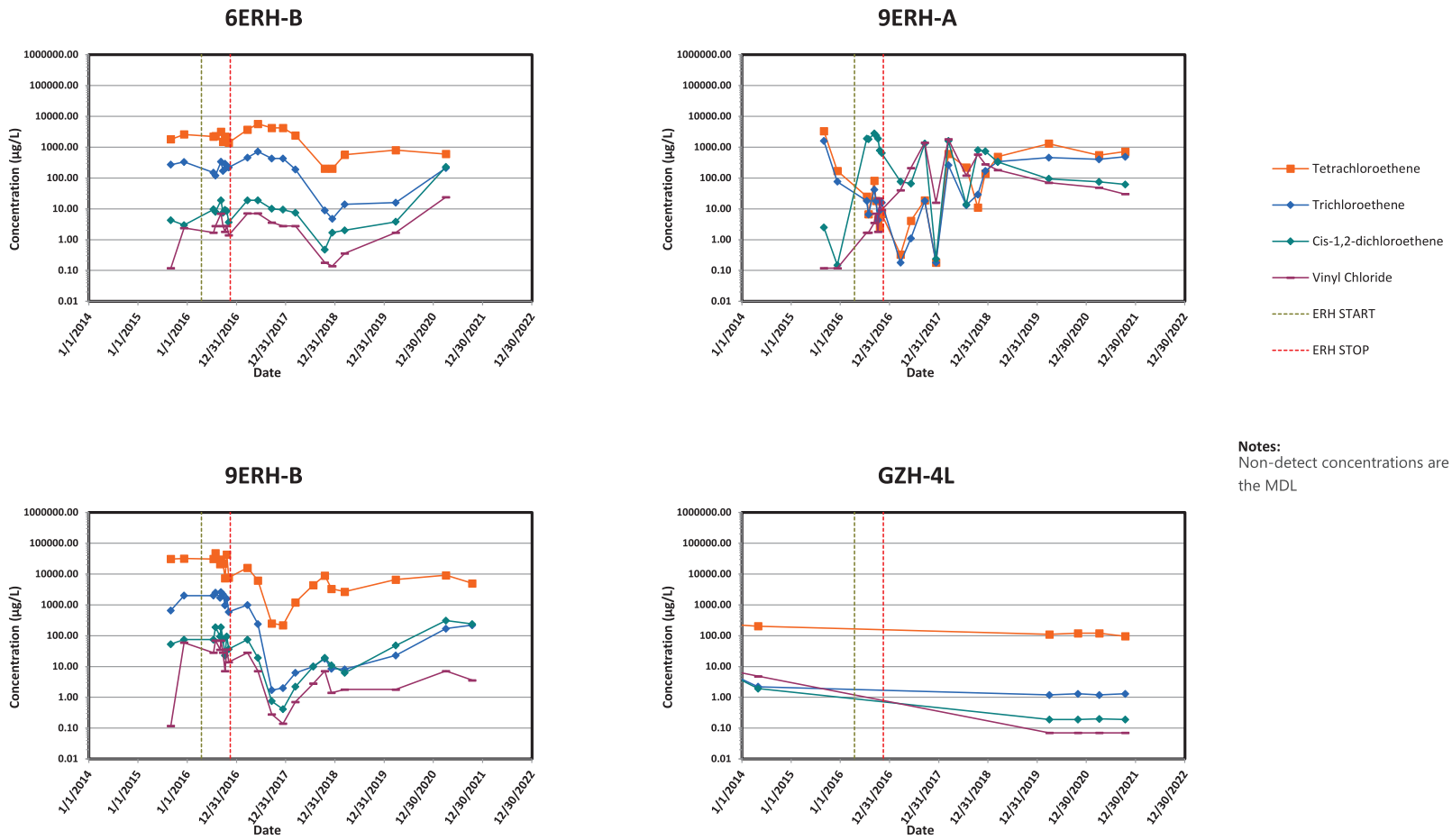
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20A

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
ERH AREA



Notes:
Non-detect concentrations are shown at the MDL

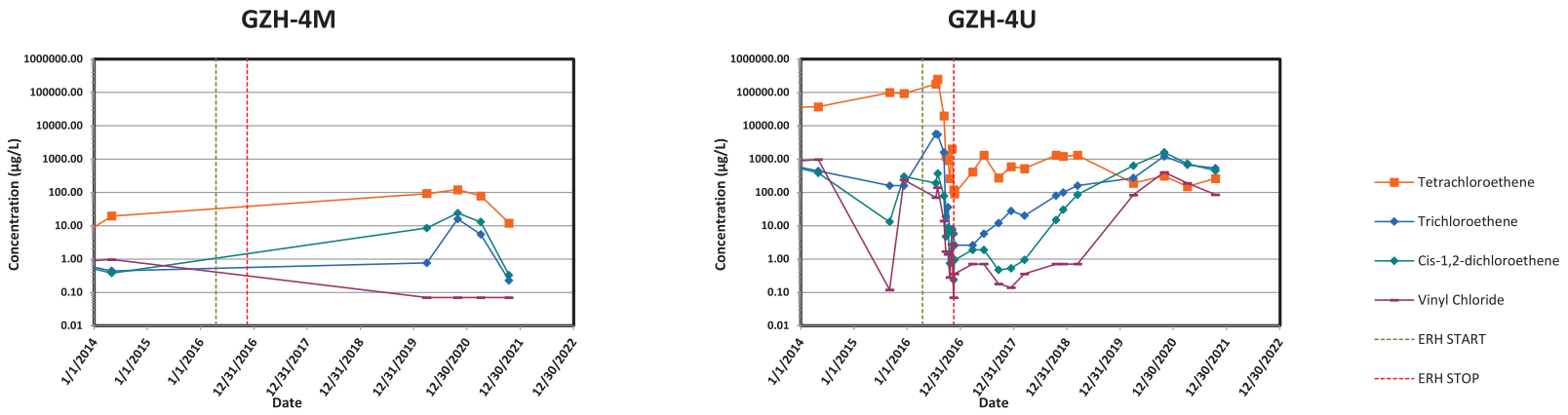
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20A

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
ERH AREA



Notes:
Non-detect concentrations are shown at the MDL

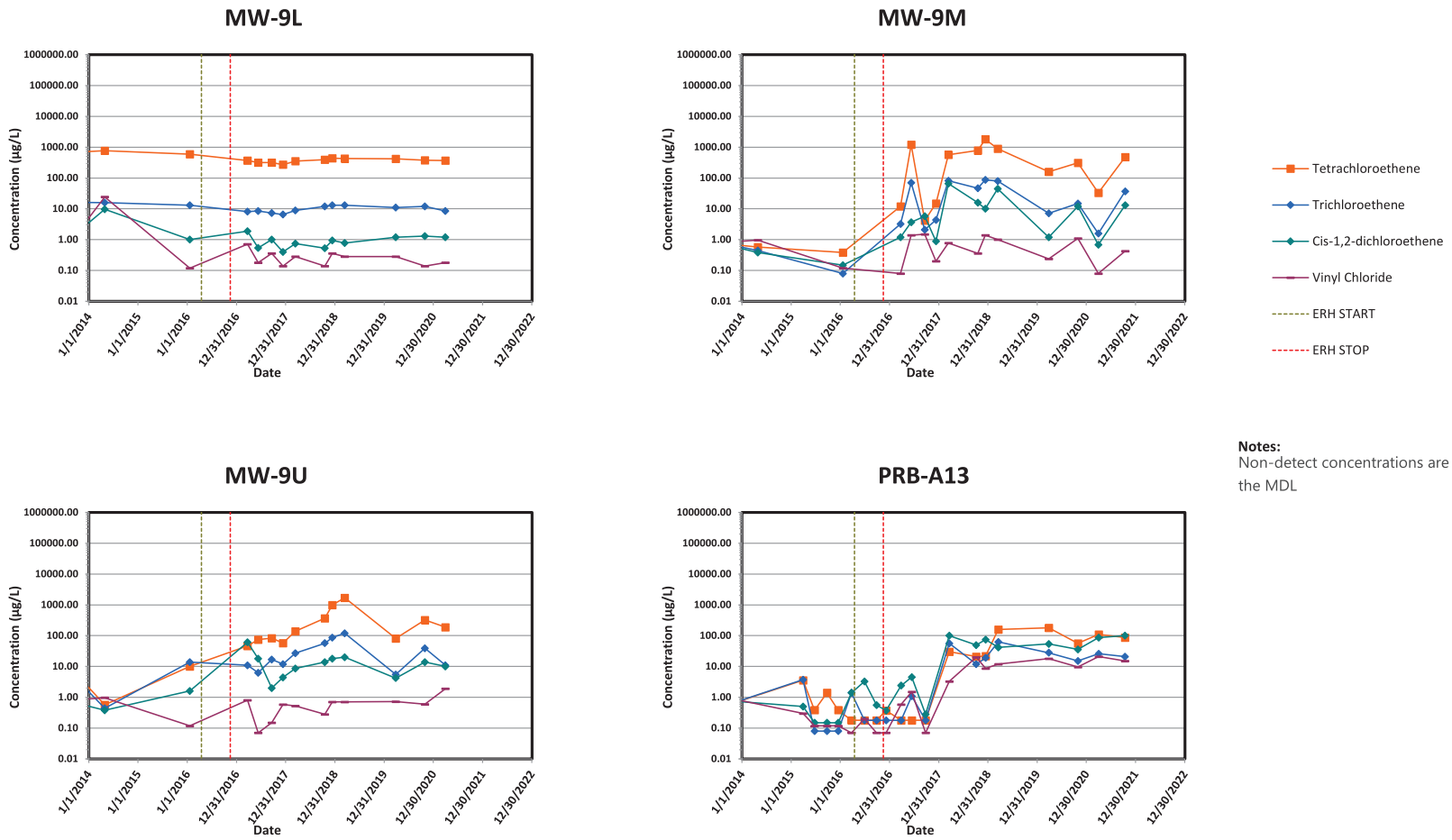
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20B

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
PRB AREA



Notes:
Non-detect concentrations are shown at the MDL

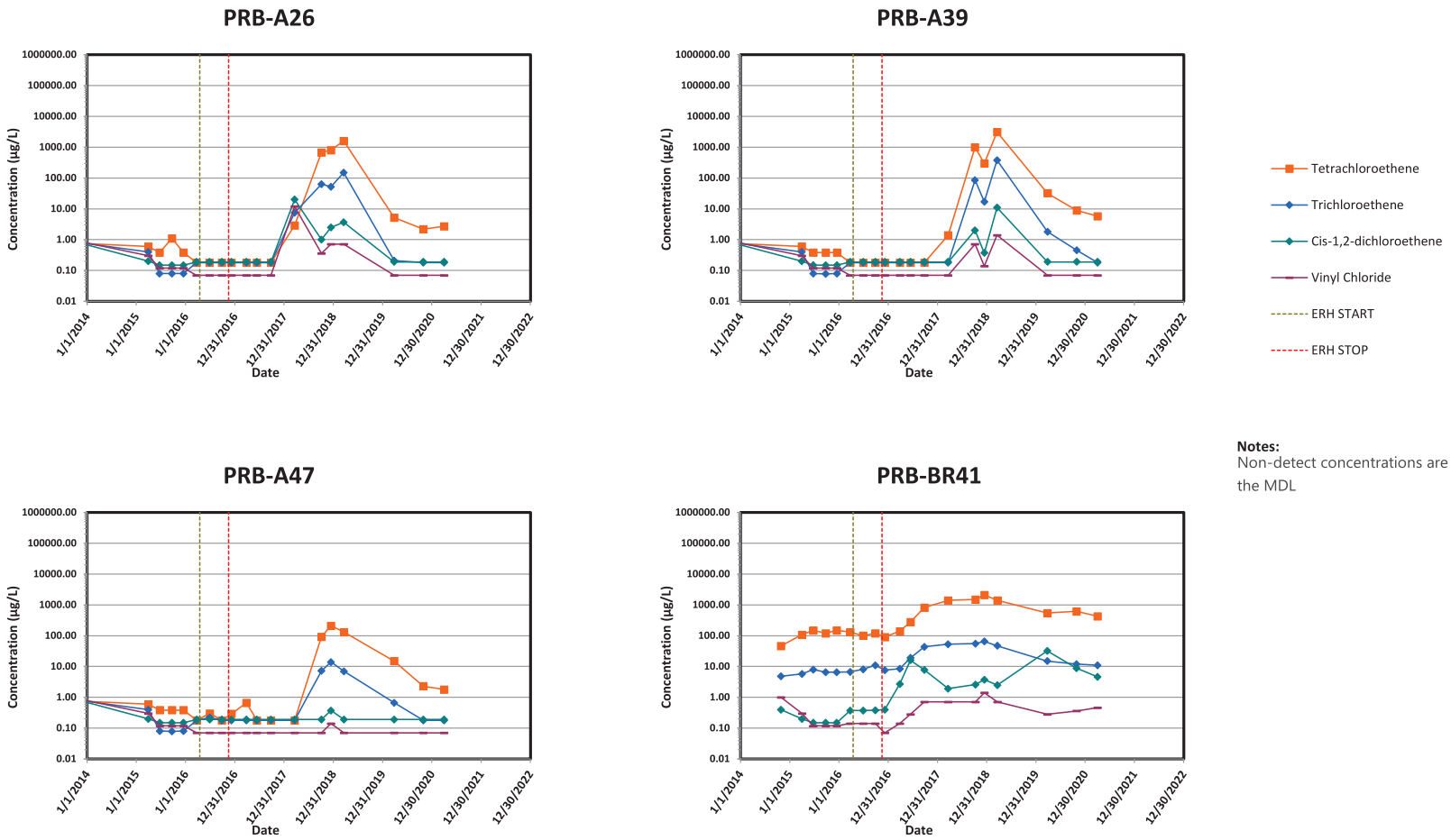
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20B

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
PRB AREA



Notes:
Non-detect concentrations are shown at the MDL

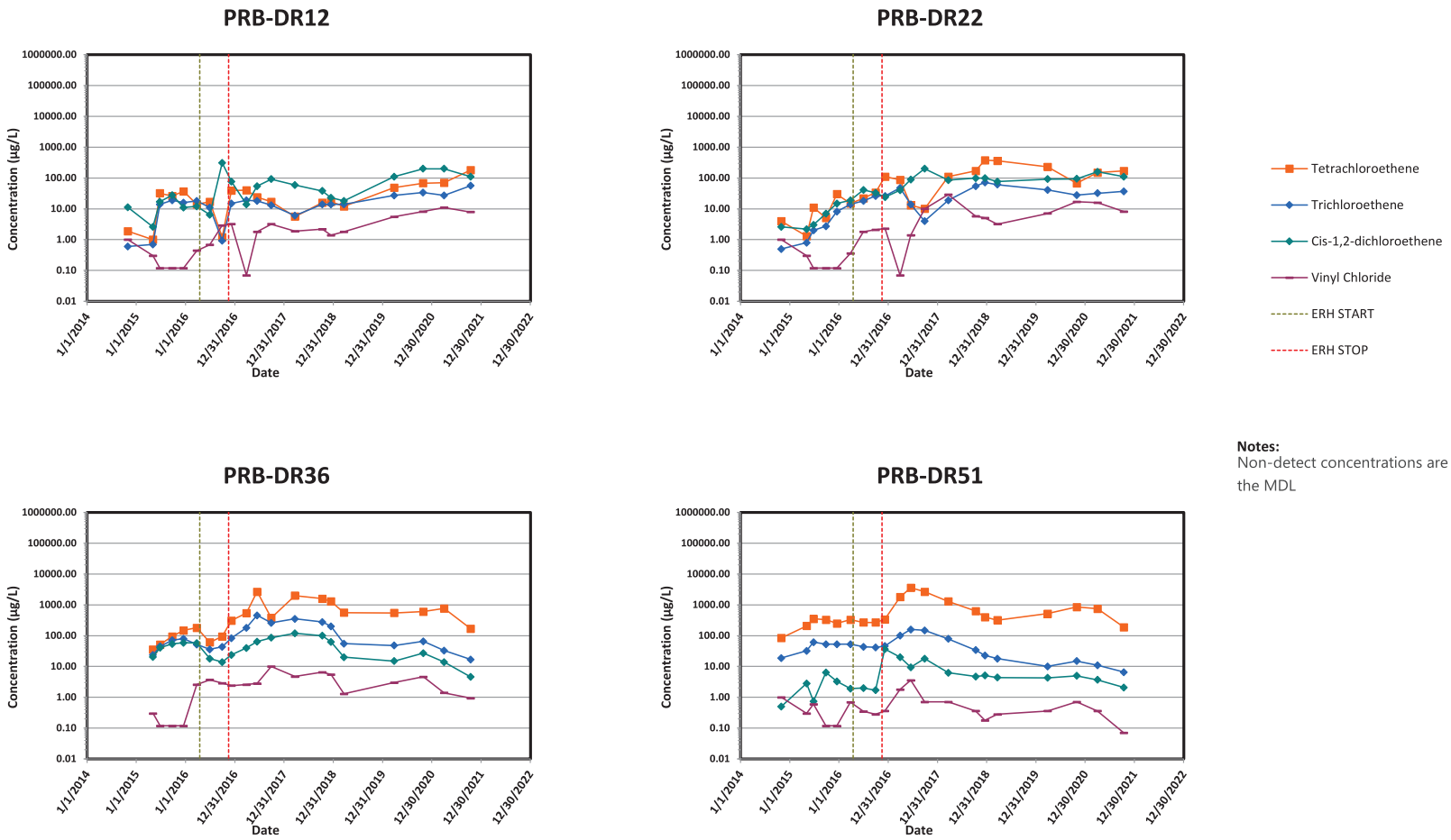
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20B

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
PRB AREA



Notes:
Non-detect concentrations are shown at the MDL

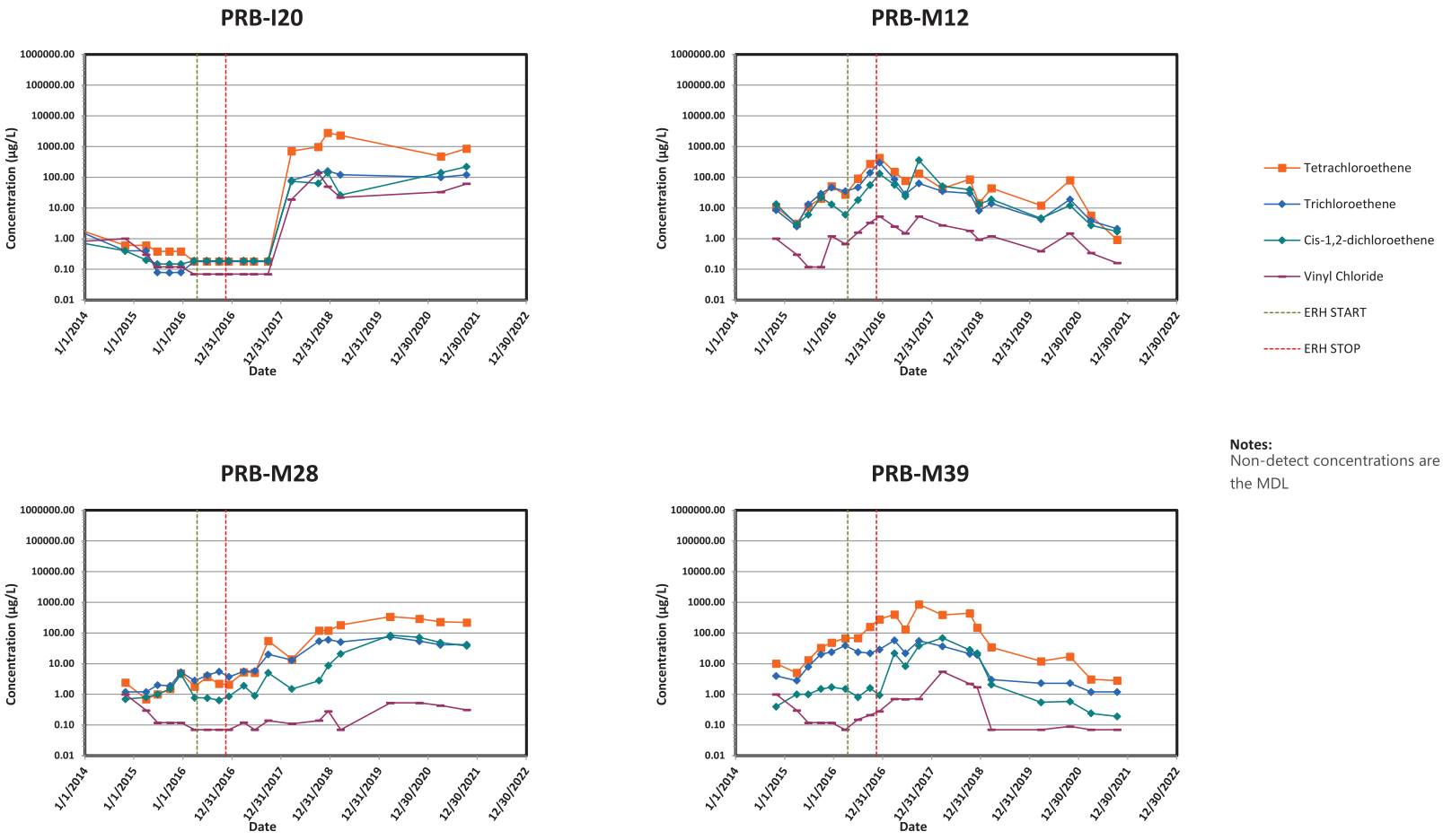
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20B

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
PRB AREA



Notes:
Non-detect concentrations are shown at the MDL

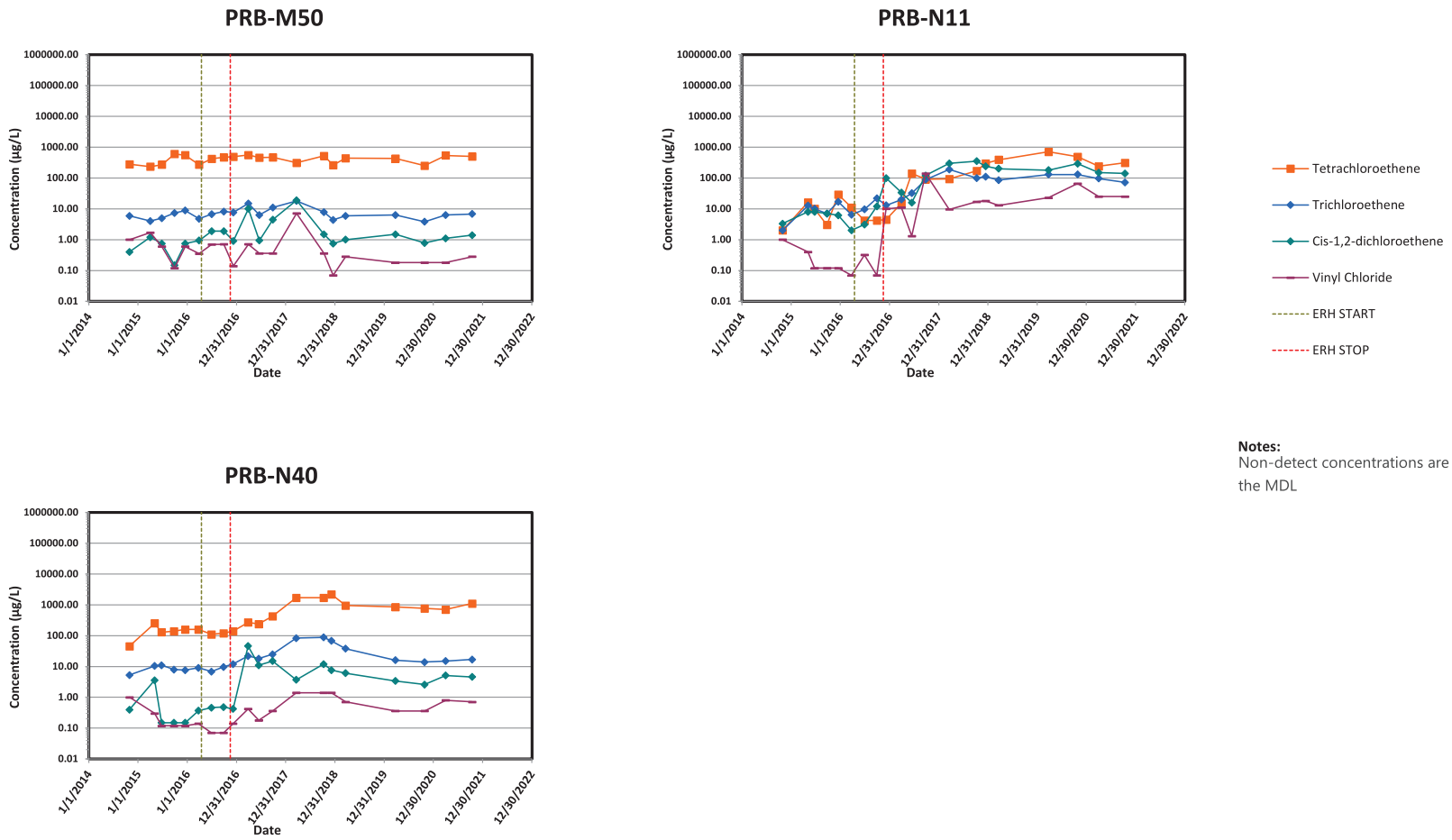
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20B

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
PRB AREA



Notes:
Non-detect concentrations are shown at the MDL

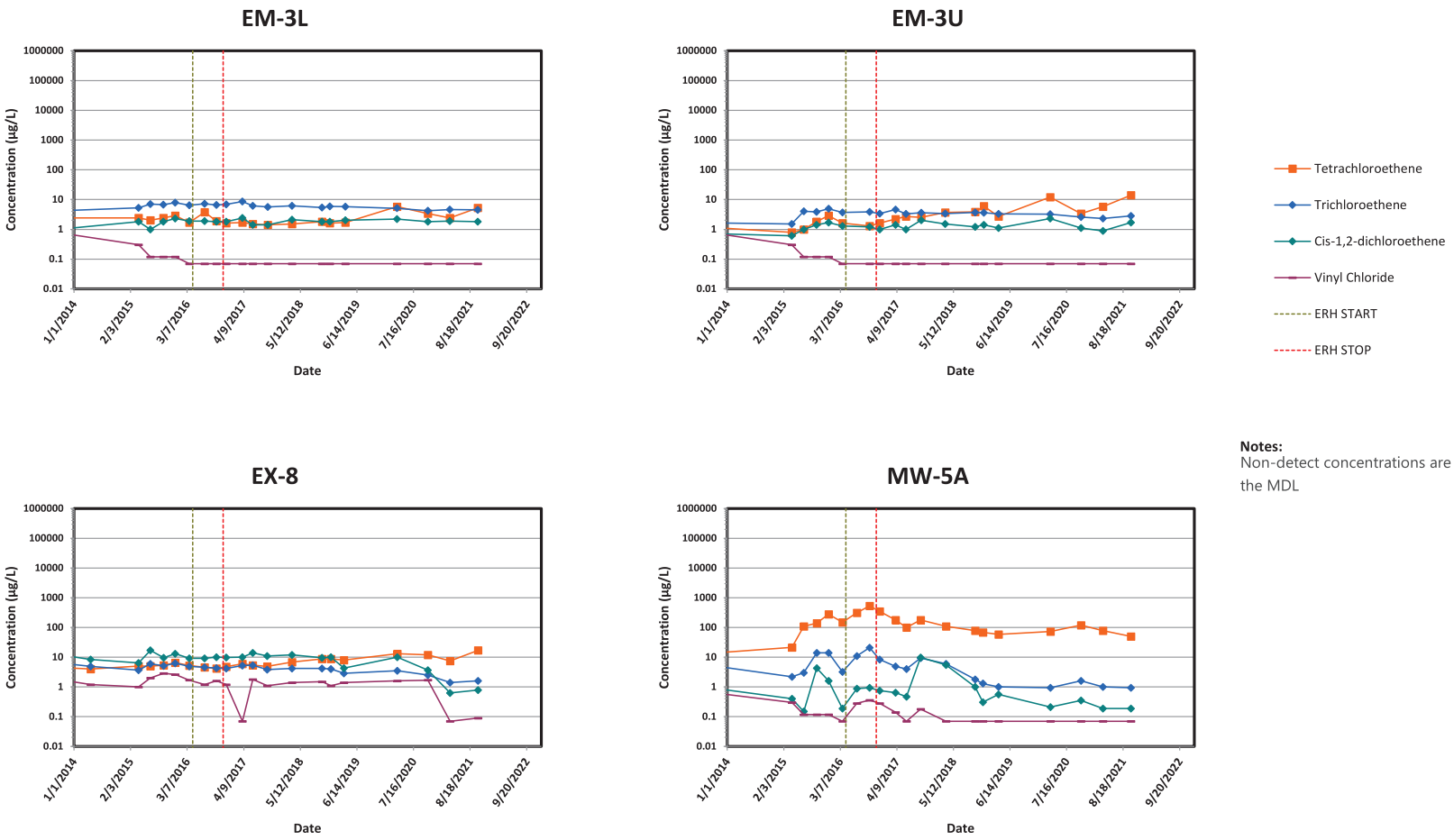
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

FIGURE 20C

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
DILUTE PLUME AREA



Notes:
Non-detect concentrations are shown at the MDL

Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-14: PCE and TCE Trends at Select Monitoring Wells

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
2021 SITEWIDE GROUNDWATER MONITORING REPORT

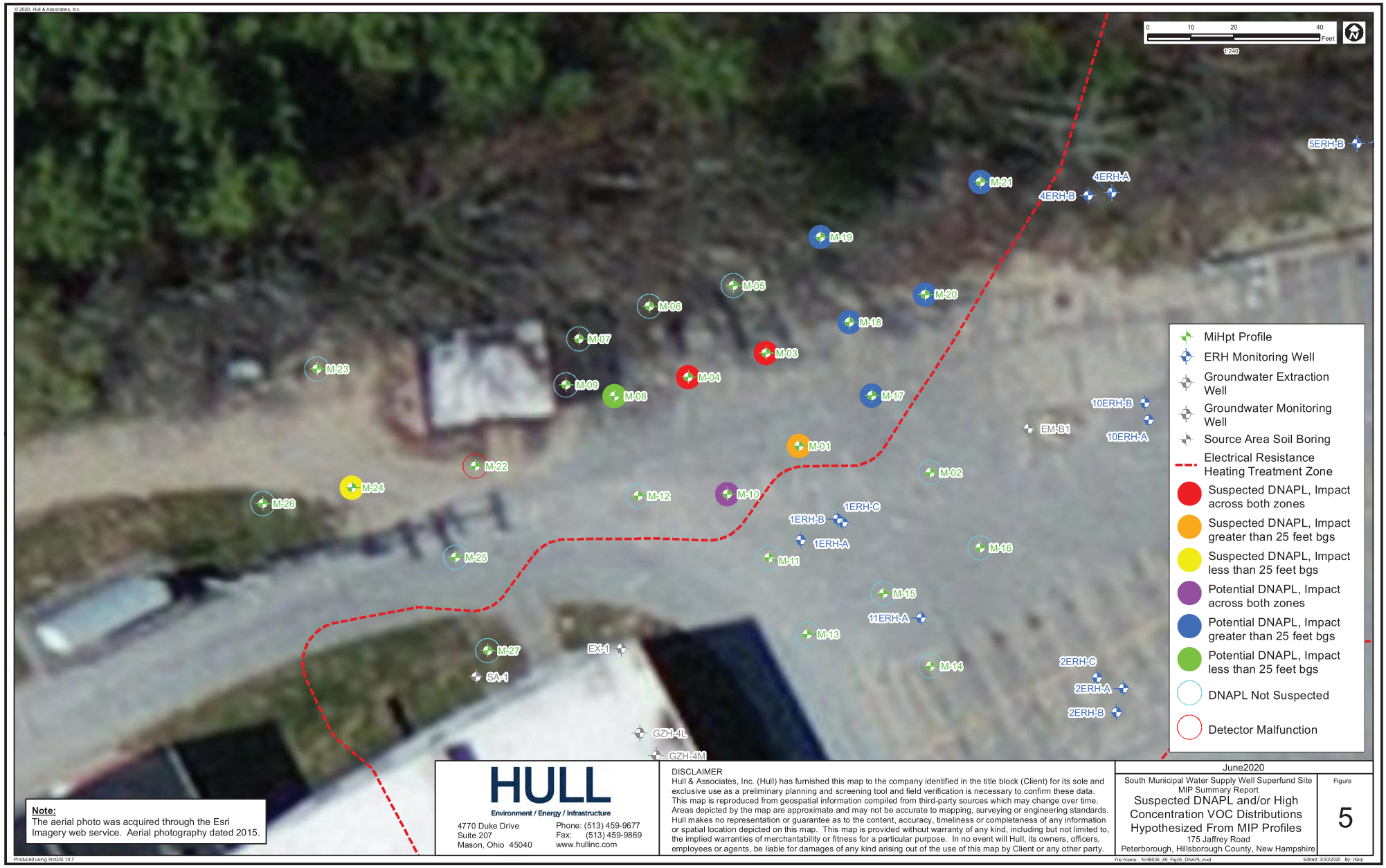
FIGURE 20C

PCE AND TCE TRENDS AT SELECT MONITORING WELLS
DILUTE PLUME AREA

Notes:
Non-detect concentrations are shown at the MDL

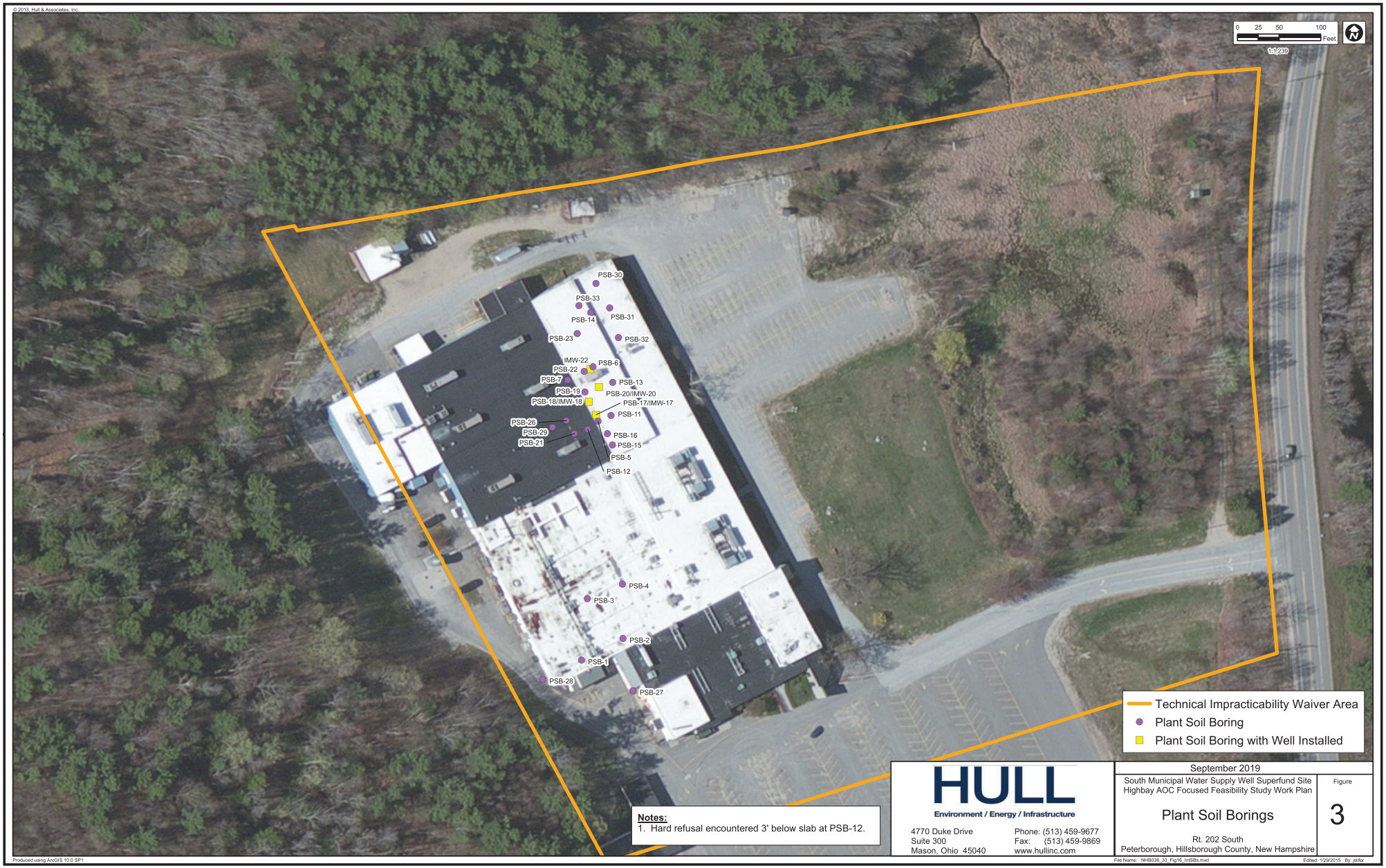
Source: Figures 20A, 20B, and 20C from the Site's January 2023 Post-Remedy Sitewide Long-Term Groundwater Monitoring Program Report

Figure F-15: Suspected DNAPL and/or High Concentration VOC Distributions Hypothesized from MIP Profiles



Source: Figure 5 from the Site's June 2020 ERH MiHpt Investigation Summary

Figure F-16: Plant Soil Borings



Source: Figure 3 from the Site's 2019 Focused Feasibility Study Work Plan for Highbay AOC

Table F-1: Sitewide Groundwater Long-Term Monitoring, March 2023

SOUTH MUNICIPAL WATER SUPPLY WELL SUPERFUND SITE
PETERBOROUGH, NEW HAMPSHIRE
TABLE 2
TABULATED RESULTS FROM THE SITEWIDE LONG-TERM MONITORING PROGRAM
MARCH 2023

Parameter					1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,4-Dioxane	cis-1,2-Dichloroethene	Tetrachloroethene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl chloride
CASNumber					71-55-6	75-34-3	75-35-4	123-91-1	156-59-2	127-18-4	156-60-5	79-01-6	75-01-4
Reporting Units	Location	Sample Name	Date Sampled	Sample Type	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
NHDES AGQS					200	81	7	0.32	70	5	100	5	2
EPA MCL					200	-	7	-	70	5	100	5	2
Plume Core/Former ERH Treatment Area	10ERH-A	5027:10ERH-A:G033123	3/31/2023	N	< 6.3	< 8.4	**14 J**	0.189	**120**	**3600**	< 6.5	**490**	**26 J**
	10ERH-B	5027:10ERH-B:G033123	3/31/2023	N	< 40	< 52	**640**	< 0.0303	**760**	**64000**	< 41	**5000**	< 18
	12ERH-A	5027:12ERH-A:G033123	3/31/2023	N	< 7.9	< 10	< 8.4	0.234	62	**5100**	< 8.2	**160**	< 3.6
		5027:12ERH-D:G033123	3/31/2023	FD	< 7.9	< 10	< 8.4	0.248	65	**5300**	< 8.2	**170**	< 3.6
	1ERH-A	5027:1ERH-A:G033123	3/31/2023	N	< 0.16	< 0.21	< 0.17	< 0.0314	7.2	**190**	< 0.16	**8**	0.12 J
	1ERH-B	5027:1ERH-B:G033123	3/31/2023	N	< 160	< 210	< 170	< 0.0320	**540**	**120000**	< 160	**1300**	< 71
		5027:1ERH-D:G033123	3/31/2023	FD	< 160	< 210	< 170	< 0.0332	**400 J**	**96000**	< 160	**1000**	< 71
	2ERH-A	5027:2ERH-A:G033123	3/31/2023	N	< 16	< 21	**58**	0.0588 J	**940**	**7900**	< 16	**350**	< 7.1
		5027:2ERH-D:G033123	3/31/2023	FD	< 16	< 21	**56**	< 0.0320	**750**	**9900**	< 16	**360**	< 7.1
	2ERH-B	5027:2ERH-B:G033123	3/31/2023	N	< 1.6	< 2.1	< 1.7	< 0.0320	< 1.9	**1100**	< 1.6	3.6 J	< 0.71
	3ERH-A	5027:3ERH-A:G033123	3/31/2023	N	< 3.2	< 4.2	< 3.4	**0.489**	61	**1800**	4.5 J	**310**	**19 J**
	3ERH-B	5027:3ERH-B:G033123	3/31/2023	N	150	< 10	**280**	0.119 J	**230**	**6000**	< 8.2	**470**	**34 J**
	6ERH-A	5027:6ERH-A:G033023	3/30/2023	N	< 0.63	< 0.84	6.9	0.174	**360**	**320**	5	**400**	**43**
	6ERH-B	5027:6ERH-B:G033023	3/30/2023	N	< 6.3	< 8.4	**91**	0.128 J	**110**	**3500**	< 6.5	**330**	**16 J**
	8ERH-A	5027:8ERH-A:G033023	3/30/2023	N	< 0.16	< 0.21	< 0.17	< 0.0308	< 0.19	0.41 J	< 0.16	0.24 J	< 0.07
	8ERH-B	5027:8ERH-B:G033023	3/30/2023	N	< 1.6	< 2.1	**8**	< 0.0320	**840**	**470**	**130**	**1300**	**310**
	9ERH-A	5027:9ERH-A:G033123	3/31/2023	N	27	2.3 J	**7.1**	**0.843**	49	**1800**	< 1.6	**540**	**23**
	9ERH-B	5027:9ERH-B:G033023	3/30/2023	N	< 16	< 21	**23 J**	0.172	**290**	**9600**	< 16	**220**	**24 J**
		5027:9ERH-D:G033023	3/30/2023	FD	< 16	< 21	**28 J**	0.166	**290**	**10000**	< 16	**170**	< 7.1
	GZ-7L	5027:GZ-7L:G033023	3/30/2023	N	< 0.16	< 0.21	< 0.17	< 0.0308	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	GZ-7U	5027:GZ-7U:G033023	3/30/2023	N	15	< 0.21	< 0.17	**4.8**	< 0.19	4.7	< 0.16	0.8	< 0.07
	GZH-105U	5027:GZH-105U:G033023	3/30/2023	N	1.2 J	< 0.84	> 0.68	**1.46**	< 0.75	420	< 0.65	0.98 J	< 0.28
	GZH-105M	5027:GZH-105M:G033123	3/30/2023	N	< 0.16	< 0.21	< 0.17	0.0703 J	< 0.19	**16**	< 0.16	< 0.18	< 0.07
	GZH-4L	5027:GZH-4L:G033123	3/31/2023	N	< 0.16	0.78	0.20 J	< 0.0314	< 0.19	**91**	< 0.16	1.2	< 0.07
	GZH-4M	5027:GZH-4M:G033123	3/31/2023	N	< 0.16	< 0.21	< 0.17	< 0.0314	2.3	**18**	< 0.16	0.66	< 0.07
	GZH-4U	5027:GZH-4U:G033123	3/31/2023	N	< 0.16	< 0.21	0.76	0.0627 J	**180**	**160**	7.9	**170**	**50**
		5027:GZH-4D:G033123	3/31/2023	FD	< 0.32	< 0.42	0.75 J	< 0.0332	**180**	**130**	7.9	**150**	**53**
	GZH-7M	5027:GZH-7M:G033023	3/30/2023	N	< 0.16	< 0.21	< 0.17	< 0.0308	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
PRB Compliance Boundary	GZ-5L	5027:GZ-5L:G032823	3/28/2023	N	< 0.16	< 0.21	< 0.17	< 0.0303	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	GZ-5U	5027:GZ-5U:G032823	3/28/2023	N	< 0.16	< 0.21	< 0.17	< 0.0303	0.27 J	< 0.18	< 0.16	< 0.18	< 0.07
	MW-5A	5027:MW-5A:G032923	3/29/2023	N	2.0	< 0.21	0.17 J	**3.45**	0.22 J	**42**	< 0.16	0.74	< 0.07
	MW-5B	5027:MW-5B:G032923	3/29/2023	N	3.2	1.5	3.2	**5.08**	**82**	**77**	0.46 J	**43**	**5.6**
	MW-9L	5027:MW-9L:G032923	3/29/2023	N	1.9	< 0.52	0.48 J	< 0.0308	2.1	**230**	< 0.41	4.4	< 0.18
		5027:MW-9D:G032923	3/29/2023	FD	2.2	< 0.52	< 0.42	< 0.0303	1.9	**220**	< 0.41	4.1	< 0.18
	MW-9M	5027:MW-9M:G032923	3/29/2023	N	1.1	< 0.21	0.30 J	0.0329 J	1.3	**130**	< 0.16	**5**	0.10 J
	MW-9U	5027:MW-9U:G032923	3/29/2023	N	0.17 J	< 0.21	0.17 J	0.0827 J	1.2	**23**	< 0.16	2.8	0.28 J
	PRB-A13	5027:PRB-A13:G032823	3/28/2023	N	< 0.16	0.29 J	2.2	0.0883 J	56	**140**	0.83	**22**	**12**
	PRB-A26	5027:PRB-A26:G032823	3/28/2023	N	< 0.16	< 0.21	< 0.17	< 0.0326	< 0.19	0.67	< 0.16	< 0.18	< 0.07
	PRB-A39	5027:PRB-A39:G032823	3/28/2023	N	< 0.16	< 0.21	0.64	< 0.0308	0.34 J	**62**	< 0.16	3.8	< 0.07
	PRB-A47	5027:PRB-A47:G032823	3/28/2023	N	< 0.16	< 0.21	< 0.17	< 0.0314	< 0.19	**5.1**	< 0.16	< 0.18	< 0.07
	PRB-BR41	5027:PRB-BR41:G032823	3/28/2023	N	1.8	< 0.52	0.73 J	0.0611 J	2.4	**260**	< 0.41	4.7	0.27 J
	PRB-DR12	5027:PRB-DR12:G032823	3/28/2023	N	1	1.8	2.6	**7**	**110**	**130**	0.36 J	**43**	**15**
	PRB-DR22	5027:PRB-DR22:G032823	3/28/2023	N	1.7	1.3	3.1	**9.07**	58	**190**	0.32 J	**37**	**6.7**
	PRB-DR36	5027:PRB-DR36:G032823	3/28/2023	N	7.3	< 1.0	1.7 J	**2.21**	6.4	**880**	< 0.82	**27**	1.1 J
	PRB-DR51	5027:PRB-DR51:G032823	3/28/2023	N	4.5	< 1.0	< 0.84	0.114 J	1.7 J	**440**	< 0.82	**7.2**	< 0.36
	PRB-GR25	5027:PRB-GR25:G032823	3/28/2023	N	4.5	0.58 J	0.40 J	**19.6**	0.25 J	**5**	< 0.16	0.77	< 0.07
	PRB-GR50	5027:PRB-GR50:G032823	3/28/2023	N	3.4	0.22 J	0.19 J	**8.08**	< 0.19	**16**	< 0.16	0.44 J	< 0.07
	PRB-M12	5027:PRB-M12:G032823	3/28/2023	N	0.30 J	0.62 J	< 0.17	**3.89**	0.45 J	0.46 J	< 0.16	1.5	< 0.07
	PRB-M28	5027:PRB-M28:G032823	3/28/2023	N	1.2	2.2	1.3	**11.5**	21	**83**	< 0.16	**17**	0.37 J
	PRB-M39	5027:PRB-M39:G032923	3/29/2023	N	2.1	0.33 J	< 0.17	**5.82**	< 0.19	1.3	< 0.16	0.88	< 0.07
	PRB-M50	5027:PRB-M50:G032923	3/29/2023	N	8.9	1.4 J	1.4 J	0.138	1.5 J	**510**	< 0.82	**8.3**	< 0.36
	PRB-N11	5027:PRB-N11:G032923	3/29/2023	N	1.8	1.0 J	2.5	**0.946**	**89**	**230**	0.73 J	**56**	**19**
	PRB-N40	5027:PRB-N40:G032923	3/29/2023	N	3.6	< 0.84	0.71 J	0.112 J	4	**430**	< 0.65	**12**	0.32 J
	PRB-O14	5027:PRB-O14:G032823	3/28/2023	N	< 0.16	< 0.21	< 0.17	0.0509 J	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	PRB-O26	5027:PRB-O26:G032823	3/28/2023	N	< 0.16	< 0.21	< 0.17	0.306	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	PRB-O40	5027:PRB-O40:G032923	3/29/2023	N	1	0.45 J	< 0.17	**6.01**	< 0.19	0.74	< 0.16	0.22 J	< 0.07
	PRB-O52	5027:PRB-O52:G032923	3/29/2023	N	< 0.16	< 0.21	< 0.17	0.0853 J	< 0.19	0.42 J	< 0.16	< 0.18	< 0.07
	PRB-Q20	5027:PRB-Q20:G032923	3/29/2023	N	< 0.16	< 0.21	< 0.17	< 0.0320	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	PRB-Q40	5027:PRB-Q40:G032923	3/29/2023	N	< 0.16	< 0.21	< 0.17	< 0.0332	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
Dilute Plume/Potential Receptors	EM-3L	5027:EM-3L:G033023	3/30/2023	N	4.2	0.92	1.4	**4.37**	2.6	**11**	0.20 J	3.8	< 0.07
	EM-3U	5027:EM-3U:G033023	3/30/2023	N	3.8	0.51 J	0.92	**2.88**	1.4	**27**	< 0.16	3.4	< 0.07
	EX-8	5027:EX-8:G033023	3/30/2023	N	1.1	0.66 J	0.38 J	**3.19**	1	**10**	< 0.16	1.8	1.6
	MW-11L	5027:MW-11L:G033023	3/30/2023	N	< 0.16	< 0.21	< 0.17	< 0.0320	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	MW-11U	5027:MW-11U:G033023	3/30/2023	N	< 0.16	< 0.21	< 0.17	< 0.0320	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	MW-7L	5027:MW-7L:G032923	3/29/2023	N	< 0.16	< 0.21	< 0.17	0.0789 J	0.20 J	< 0.18	< 0.16	< 0.18	< 0.07
	MW-7U	5027:MW-7U:G032923	3/29/2023	N	< 0.16	< 0.21	< 0.17	< 0.0303	< 0.19	< 0.18	< 0.16	< 0.18	< 0.07
	RP-1	5027:RP-1:G033023	3/30/2023	N	0.64	1.8	1.5	**6.77**	4.4	2.7	0.9	**5.4**	< 0.07

Notes:
NHDES AGQS = New Hampshire Department of Environmental Services Ambient Groundwater Quality Standard
EPA MCL = Environmental Protection Agency Maximum Contamination Level
Bold values are concentrations that exceed the MCL or AGQS
< (MDL) = The analyte was not detected above the method detection limit
ug/L = micrograms per liter
J = The concentration was below the reporting limit and is estimated
N = Normal
FD = Field Duplicate
Field Duplicates (identified as sample type = FD) are displayed in the row below the associated parent sample (identified as sample type = N)

Source: Table 2 from the Site's March 2023 Data Deliverable of Post-Remedy Sitewide Long-Term Monitoring Program

Table F-2: PFAS Sampling Results, 2023

Parameter	Well ID	Sample Type	Date Sampled	HFPO-DA	PFBS	PFHxS	PFNA	PFOS[1]	PFOA[1]
CASNumber				13252-13-6	375-73-5	355-46-4	375-95-1	1763-23-1	335-67-1
Reporting Units				ng/l	ng/l	ng/l	ng/l	ng/l	ng/l
NHDES AGQS				-	-	18	11	15	12
USEPA RSL - HQ=0.1				6	600	39	6	4	6
Proposed USEPA MCL				Hazard Index 1.0[2]				4	4
December 2018									
Dilute Plume	EM-3L	N	12/6/2018	NS	NS	NS	NS	< 1.78	< 1.78
	MW-7U	N	12/6/2018	NS	NS	NS	NS	0.673 J	4.29
Former ERH Treatment Area	1ERH-B	N	12/6/2018	NS	NS	NS	NS	**8.33**	3.79
	1ERH-B	D	12/6/2018	NS	NS	NS	NS	**7.1**	3.82
	9ERH-B	N	12/6/2018	NS	NS	NS	NS	< 1.84	< 1.84
	GZ-7U	N	12/6/2018	NS	NS	NS	NS	< 1.83	< 1.83
	GZ-8U	N	12/6/2018	NS	NS	NS	NS	< 1.82	< 1.82
	GZH-4U	N	12/6/2018	NS	NS	NS	NS	< 1.82	1.02 J
PRB Compliance Boundary	MW-5A	N	12/6/2018	NS	NS	NS	NS	< 1.83	< 1.83
	PRB-M39	N	12/6/2018	NS	NS	NS	NS	1.14 J	1.00 J
	PRB-N40	N	12/6/2018	NS	NS	NS	NS	< 1.82	0.996 J
	PRB-O40	N	12/6/2018	NS	NS	NS	NS	1.00 J	1.14 J
	PRB-P20	N	12/6/2018	NS	NS	NS	NS	< 1.81	0.873 J
March 2023									
Dilute Plume	EM-3L	N	3/30/2023	< 19.7	< 0.207	< 0.327	< 0.271	< 0.438	0.428 J
	MW-7U	N	3/29/2023	< 20.6	0.961 J	0.899 JF	< 0.284	0.819 J	2.84
Former ERH Treatment Area	1ERH-B	N	3/31/2023	< 20.7	1.05 J	0.618 JF	< 0.285	0.998 J	4.81
	9ERH-B	N	3/30/2023	< 19.8	0.764 J	0.397 J	< 0.272	1.54 J	1.94
	GZ-7U	N	3/30/2023	< 20.2	1.27 JF	0.334 J	< 0.277	0.576 J	1.59 J
	GZ-8U	N	3/30/2023	< 20.6	< 0.216	< 0.342	< 0.284	< 0.458	0.418 J
	GZH-4U	N	3/31/2023	< 20.6	1.33 J	0.909 J	< 0.284	1.62 J	3.25
PRB Compliance Boundary	MW-5A	N	3/29/2023	< 19.8	0.437 J	< 0.328	< 0.272	0.566 J	1.00 J
	PRB-M39	N	3/29/2023	< 20.3	0.440 J	< 0.336	< 0.279	1.13 J	0.812 J
	PRB-N40	N	3/29/2023	< 20.6	0.239 J	< 0.340	0.322 J	1.02 J	1.21 J
	PRB-O40	N	3/29/2023	< 20.4	0.715 J	0.553 J	< 0.280	1.34 J	2.07
	PRB-P20	N	3/29/2023	< 20.7	0.522 J	< 0.343	< 0.285	0.855 JF	1.40 J

Notes:

1. Samples collected in December 2018 with concentrations of PFOA and PFOS that were non-detect are reported as less than the reporting limit.
2. The health based values for calculating the Hazard Index are: PFNA - 10 ng/L, PFBS - 2,000 ng/L, PFHxS - 9 ng/L, and HFPO-DA - 10 ng/L (https://www.epa.gov/system/files/documents/2023-03/How%20do%20I%20calculate%20the%20Hazard%20Index._3.14.23.pdf)

< 0.271 = less than method detection limit

Bolded numbers indicate detections that exceed the USEPA RSL (HQ=0.1)

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level

USEPA RSL = United States Environmental Protection Agency Remedial Screening Level

NHDES AGQS = New Hampshire Department of Environmental Services Ambient Groundwater Quality Standard

NS = not sampled

N = normal sample

D = duplicate sample

ng/L = nanograms per liter

J = the compound was detected at a concentration below the laboratory reporting limit and the concentration is estimated

JF= The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

Source: Table 2 from the Site's March 2023 PFAS Groundwater Monitoring Analytical Results

Table F-3: Summary of 2010 and 2019 Soil Gas and Indoor Air Sampling Results

SUMMARY OF 2010 AND 2019 SOIL GAS AND INDOOR AIR SAMPLING RESULTS

Chemical	USEPA VISL - Soil Gas Criterion (µg/m³)			NHDES Soil Gas Screening Levels (µg/m³)		September 2019 Soil Gas Sampling Results (µg/m³)					November 2010 Soil Gas and Indoor Air Sampling Results (µg/m³)									
	Commercial	Residential	School	Commercial	Residential	SGA2b	SGA3b	SGA4b	SGA6b	SGA7b	SGA1b	SGA2b	SGA3b	SGA4b	SGA5b	SGA6b	SGA7b	SGA5a	SGA6a	SGA7a
PCE	584	139	811	1,800	400	2.9	1.63	0.414	3.92	2.15	<0.68	<0.28	<0.68	2.78	8.68	3.39	2.10	<0.41	<0.41	<0.41
TCE	29.2	7.0	40.6	90	20	0.107	<0.107	0.446	0.441	<0.107	<0.43	<0.28	<0.43	<0.43	<1.72	<0.43	<0.43	<0.28	<0.28	<0.28
VC	92.9	5.6	7.2	140	20	<0.051	<0.051	<0.051	<0.051	<0.051	<0.71 J	<0.16	<0.71	<0.71	<2.84	<0.71	<0.71	<0.16	<0.16	<0.16

Notes:

Exterior Soil Gas
Interior Soil Gas
Indoor Air

µg/m³: micrograms per cubic meter
NHDES: New Hampshire Department of Environmental Services
PCE: tetrachloroethene
TCE: trichloroethene
USEPA: United States Environmental Protection Agency
VC: vinyl chloride
VISL: vapor intrusion screening level

Sources:

New Hampshire Department of Environmental Services Revised Vapor Intrusion Screening Levels dated February 7, 2013.
https://www.education.nh.gov/sites/g/files/ehbemt326/files/inline-documents/sonh/suggested-calendar-2022-2023.pdf

ASSUMPTIONS INPUT INTO USEPA'S VISL CALCULATOR FOR THE SDE BUILDING

Calculation Parameter	Commercial VISL[1]	Residential VISL[2]	School VISL
Hazard Quotient	0.1	0.1	0.1
Target Cancer Risk	1E-6	1E-6	1E-6
Exposure Frequency	250 days per year	350 days per year	180 days per year[3]
Exposure Time	8 hours per day	24 hours per day	8 hours per day[4]
Exposure Duration	25 years	26 years	24 years
Groundwater Temperature[5]	13°C	13°C	13°C

1. Commercial VISL assumptions are the same as those used in Hull 2020.
2. The exposure frequency, time, and duration assumptions are the standard assumptions for residential VISL calculations.
3. Selected using the standard New Hampshire school calendar (https://www.education.nh.gov/sites/g/files/ehbemt326/files/inline-documents/sonh/suggested-calendar-2022-2023.pdf).
4. Exposure time was increased from the typical 6 hours per day at school to 8 hours per day to be conservative.
5. Groundwater temperature in the wells near the SDE Building is typically 6°C to 11°C. The assumption of a higher groundwater temperature results in a more conservative VISL.

SDE: Staff Development for Educators
VISL: vapor intrusion screening level

Source: Tables 1 and 2 from the Site's April 2023 Response to Further Request for Vapor Intrusion Evaluation – Former SDE Building.

APPENDIX G – SITE PHOTOS

NHBB facility sign

NHBB facility

The SVE system

Location where ERH was conducted.

The former groundwater treatment plant building

Groundwater monitoring wells damaged during plowing.

Location of the original PRB wall and the to-be-installed PRB wall

Wetlands

School potentially located over the downgradient groundwater plume.


Uninhabited residence potentially located over the downgradient groundwater plume.

APPENDIX H – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: South Municipal Water Supply Well	**Date of Inspection:** 04/17/2023
Location and Region: Peterborough, New Hampshire, Region 1	**EPA ID:** NHD980671069
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** 50 degrees Fahrenheit and raining

Remedy Includes: (check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: ERH, PRB, in-situ remediation
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** — Carl Elder and Rhiannon Scott (Name) | Geosyntec Consultants (Title) | 3/30/23 (Date)
   Interviewed ☐ at site ☐ at office ☒ by phone : _____
   Problems, suggestions ☐ Report attached: Appendix E

2. **O&M Staff** — _____ (Name) | _____ (Title) | _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency NHDES
   Contact Stephanie Monette (Name) | Project Manager (Title) | 3/28/23 (Date) | _____ (Phone)
   Problems/suggestions ☐ Report attached: See Appendix E

   Agency Town of Peterborough
   Contact Nicole MacStay (Name) | Town Administrator (Title) | 3/21/23 (Date) | _____ (Phone)
   Problems/suggestions ☐ Report attached: See Appendix E

   Agency Town of Peterborough
   Contact Seth MacLean (Name) | Assistant Town Administrator (Title) | 3-21-23 (Date) | _____ (Phone)
   Problems/suggestions ☐ Report attached: See Appendix E

   Agency _____
   Contact _____ | _____ | _____ | _____

Name	Title	Date	Phone	
Problems/suggestions ☐ Report attached: _____				
Agency _____				
Contact _____	_____	_____	_____	
Name	Title	Date	Phone	
Problems/suggestions ☐ Report attached: _____				

4. **Other Interviews** (optional) ☒ Report attached: See Appendix E

Chris Rawnsley, NHBB

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☒ N/A
☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

3. **O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5. **Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

6. **Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

7. **Groundwater Monitoring Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☒ Readily available ☐ Up to date ☐ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☒ N/A

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): None

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ _____ _____

Name Title Date Phone

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: _____

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads Damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths: _____ Widths: _____ Depths: _____

Remarks: _____

3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Area extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Area extent: _____
	☐ Ponding	☐ Location shown on site map	Area extent: _____
	☐ Seeps	☐ Location shown on site map	Area extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Area extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Area extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable	☐ N/A
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
C. Letdown Channels		☐ Applicable	☐ N/A
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		

1.	**Settlement** (Low spots)	☐ Location shown on site map	☐ No evidence of settlement
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	**Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation
	Material type:_____		Area extent: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ No evidence of erosion
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	**Undercutting**	☐ Location shown on site map	☐ No evidence of undercutting
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	**Obstructions**	Type: _____	☐ No obstructions
	☐ Location shown on site map	Area extent: _____	
	Size: _____		
	Remarks: _____		
6.	**Excessive Vegetative Growth**	Type: _____	
	☐ No evidence of excessive growth		
	☐ Vegetation in channels does not obstruct flow		
	☐ Location shown on site map	Area extent: _____	
	Remarks: _____		
D. Cover Penetrations	☐ Applicable	☐ N/A	
1.	**Gas Vents**	☐ Active	☐ Passive
	☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
	☐ Evidence of leakage at penetration	☐ Needs maintenance	☐ N/A	
	Remarks: _____		
2.	**Gas Monitoring Probes**		
	☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
	☐ Evidence of leakage at penetration	☐ Needs maintenance	☐ N/A	
	Remarks: _____		
3.	**Monitoring Wells** (within surface area of landfill)		
	☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
	☐ Evidence of leakage at penetration	☐ Needs maintenance	☐ N/A	
	Remarks: _____		
4.	**Extraction Wells Leachate**		
	☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A

☐ Siltation not evident

Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____

☐ Erosion not evident

Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps and Electrical**

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: The 2010 AROD did not change the original cleanup approach, as modified by the 1993 ESD, to allow natural attenuation of the dilute plume, provided there is sufficient reduction in VOC loading to groundwater from upgradient source areas and capture and treatment of any remaining contaminant plume at the TI Waiver Area boundary. Some monitoring wells were observed to be damaged during the Site inspection but have since been repaired.

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).
The ERH and PRB remedies designed to contain the plume were not as effective as anticipated. A new PRB is being installed this summer. Groundwater monitoring continues to ensure the location of the plume is monitored. There are currently no vapor intrusion concerns.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
Current O&M activities are generally adequate, monitoring the status of the remedy.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.
Remedy problems were identified previously. A new remedy is in the process of being implemented.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
There are no current opportunities for optimization since the new remedy has yet to be implemented.

APPENDIX I – STATE ARARs REVIEW

Review of Cleanup Levels and ARARs for consideration in EPA's Sixth Five-Year Review
South Municipal Well Superfund Site, Peterborough, New Hampshire
Prepared by: Stephanie Monette / NHDES
April 19, 2023

This summary has been prepared in response to a February 23, 2023, e-mail from Valerie Jurgens of the EPA requesting that NHDES identify potential changes to site cleanup levels, Applicable or Relevant and Appropriate Requirements (ARARs), and Standards for EPA's consideration in the pending Sixth Five-Year Review for the South Municipal Well Superfund Site (site).

Table 1 identifies the current Cleanup Levels (CLs), revised standards, and emerging contaminants that have had standards promulgated since the 2010 AROD.

Table 1 – Groundwater CLs (as established in the 2010 AROD), Updated Standards and Emerging Contaminants

Contaminant	Cleanup Level (µg/L)	Revised AGQS [date - revised standard]
Tetrachloroethylene	5	-
Trichloroethylene	5	-
1,1,1-Trichloroethane	200	-
1,2-Dichloroethene cis trans	 70 100	 - -
1,1-Dichloroethylene	7	-
1,1-Dichloroethane	81	
Vinyl chloride	2	
PFOA	-	July 2020 – 12 ng/L
PFOS	-	July 2020 – 15 ng/L
PFHxS	-	July 2020 – 18 ng/L
PFNA	-	July 2020 – 11 ng/L
1,4-Dioxane	3	Sept. 2018 – 0.32 ug/L

- Indicates no current site CL or no revision to original CL established in the 2010 AROD.
AGQS = Ambient Groundwater Quality Standard

Table 2 – Soil CLs (as established in the 2010 AROD), Updated Standards

Contaminant	Cleanup Level (mg/kg)	Revised AGQS [date - revised standard]
Tetrachloroethylene	2	-
Trichloroethylene	0.8	-
1,1,1-Trichloroethane	78	-
1,2-Dichloroethene cis trans	 2 9	 - -
1,1-Dichloroethylene	2	Unknown date - 14 mg/kg
1,1-Dichloroethane	3	-
Vinyl chloride	1	-
1,4-Dioxane	5	-

Review of Cleanup Levels and ARARs for consideration in EPA's Sixth Five-Year Review
South Municipal Well Superfund Site, Peterborough, New Hampshire
Prepared by: Stephanie Monette / NHDES
April 19, 2023

Consumption of site-impacted groundwater and potential for vapor intrusion exposures constitute the remaining potential exposure pathways identified at this site. Existing alternative public water supply and distribution to affected areas around the site combined with a groundwater ordinance address exposure risk associated with consumption of impacted groundwater. Vapor intrusion exposure pathways at the NHBB facility are addressed using an active SVE system and annual SVE system monitoring and reporting. Vapor intrusion exposure pathways for two additional buildings (Staff Development for Educators (SDE) Building and the unoccupied Strang residence) within the dilute plume area were evaluated by the PRP in 2019 using Commercial Vapor Intrusion Screening Levels (VISLs). Due to a change in use for the SDE building from commercial to a charter elementary school in the fall of 2022, it is appropriate to evaluate the current potential for vapor intrusion at the school with new groundwater to indoor air VISLs using a school exposure scenario. Additional soil gas, groundwater, and indoor air sampling was also requested to further evaluate vapor intrusion exposure pathway for the SDE building. It should also be confirmed that the Strang residence continues to be unoccupied.

While site soils did not pose a direct contact risk as evaluated for the 1989 ROD, it is acknowledged that contaminated soils provide potential migration of contaminants from site soils into groundwater at levels exceeding groundwater cleanup target levels. Additionally, the Agencies have recently requested additional soil sampling in the 1ERH area. Potential exposure pathways pertaining to soil in this area should be considered for evaluation after the completion of this requested sampling. Previous remedial actions conducted on site have removed potential exposure pathways pertaining to contaminated wetland sediments through excavation and off-site disposal of contaminated wetland sediments.

PFAS

As noted in Table 1, in July 2020, New Hampshire promulgated state MCLs for the following four PFAS into the State's Safe Drinking Water Act:

- PFOA: 12 ng/L (ppt)
- PFOS: 15 ng/L (ppt)
- PFHxS: 18 ng/L (ppt)
- PFNA: 11 ng/L (ppt)

Current state law requires that AGQS be the same value as any MCL established by NHDES and that they be at least as conservative as health advisories set by EPA.

The PRPs sampled twelve site wells for two PFAS compounds, PFOA and PFOS, during December, 2018. PFOA and PFOS were detected in eight of twelve site wells sampled, however detections were below the existing NHDES AGQS for PFOA and PFOS (70 ng/L) at the time. PFNA and PFHxS have not been sampled for on site, however, the Agencies have sent a request for additional PFAS sampling to be performed during the Spring 2023 groundwater sampling event, to include at a minimum, the 4 PFAS compounds with NHDES AGQS and the 6 PFAS compounds with EPA screening levels.